

**CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY**

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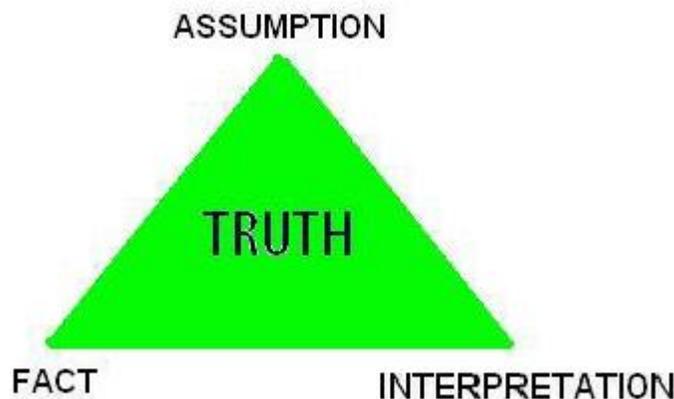
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VIDEO: [WELCOME](#)

## THE TRUTH TRIANGLE

The science of archaeology is a fascinating art which seeks to learn about the places, ways of life and points in time that people have lived. Like all knowledge, it is based on a set of facts and methodologies which, used in conjunction with a certain set of assumptions, lead to interpretations of the truth.

PHOTO LINK: [INTRO 002 Truth triangle](#)



## THE UNIQUENESS OF HISTORICAL SCIENCES

Historical sciences, like archaeology, geology and cosmology, are a special class of knowledge because they require that we make very broad assumptions which are not needed in other sciences. Whereas the chemist or physicist can conduct experiments to test their theories, historical events happened only once and cannot be repeated. Hence they are outside the realm of experimental proof. Instead, archaeologists must compile descriptions of one-of-a-kind observations and use a set of assumptions to interpret them. Those interpretations which explain available data in the most elegant or simple way are generally believed more likely to be true than interpretations that require compound assumptions or unlikely historical conditions. Hence, historical truth must always be understood in terms of probability. The wonderful thing about probability is that every theory about the past has some probability of being correct, however small. And people don't always agree about the assumptions. So differences of interpretation are common.

That is why assumptions are so important in archaeology. In this course you will learn about the different assumptions that are made by biblical archaeologists and scholars. In biblical archaeology, the assumptions often influence the interpretations much more

than the limited facts do. If you are taking this course looking for a quick reference to support your prejudices, stop now. You won't find them here. Instead you will learn how one archaeologist can look at data from an archaeological dig and conclude that it shows the Biblical text to be historically flawed while another, examining the same data, will conclude that the Biblical text is amazingly accurate.

## CONSERVATIVE MAXIMALISTS AND LIBERAL MINIMALISTS

Circular reasoning is not unique to biblical archaeology. But it is common because the relevance those interpretations have for many people's faith (or lack thereof). In order to illustrate this, I classify archaeologists as "liberal-minimalists" and "conservative-maximalists". While both seek truth, liberals tend to view biblical record as mythological stories whereas conservatives tend to view them as historical facts (see figure, below).

PHOTO LINK: INTRO 003 Truth Spectrum

HISTORICAL	TRUTH	MYTHOLOGICAL
Fact		Story
"conservative"		"liberal"
"maximalist"		"minimalist"



This system of labeling is overly simplistic. But it has the advantage of being an effective teaching tool for introducing the remarkable, misunderstood and much-debated field of biblical archaeology. For an provocative discussion of minimalists and maximalists in regards to the historicity of David and Solomon, see Yosef Garfinkel's comments about his excavations at Khirbet Qeiyafa (2011).

## FUNDAMENTALISTS AND HUMANISTIC LIBERALS

A special category of conservative interpretation is literal, biblical fundamentalism. The interpretations of fundamentalists often make particularly good examples of circular reasoning. Fundamentalist scholars start with a set of premises, and then interpret the available data in ways that re-enforce those fundamentalist pre-conceptions. Humanistic liberals do this too, from the other end of the Truth Spectrum. They assume the Bible is almost all mythological and go to outrageous lengths to discount any archaeological data that suggest any vestige of historicity. In this course I will show that both camps have relevant insights. In doing so, I expect to annoy both of them.

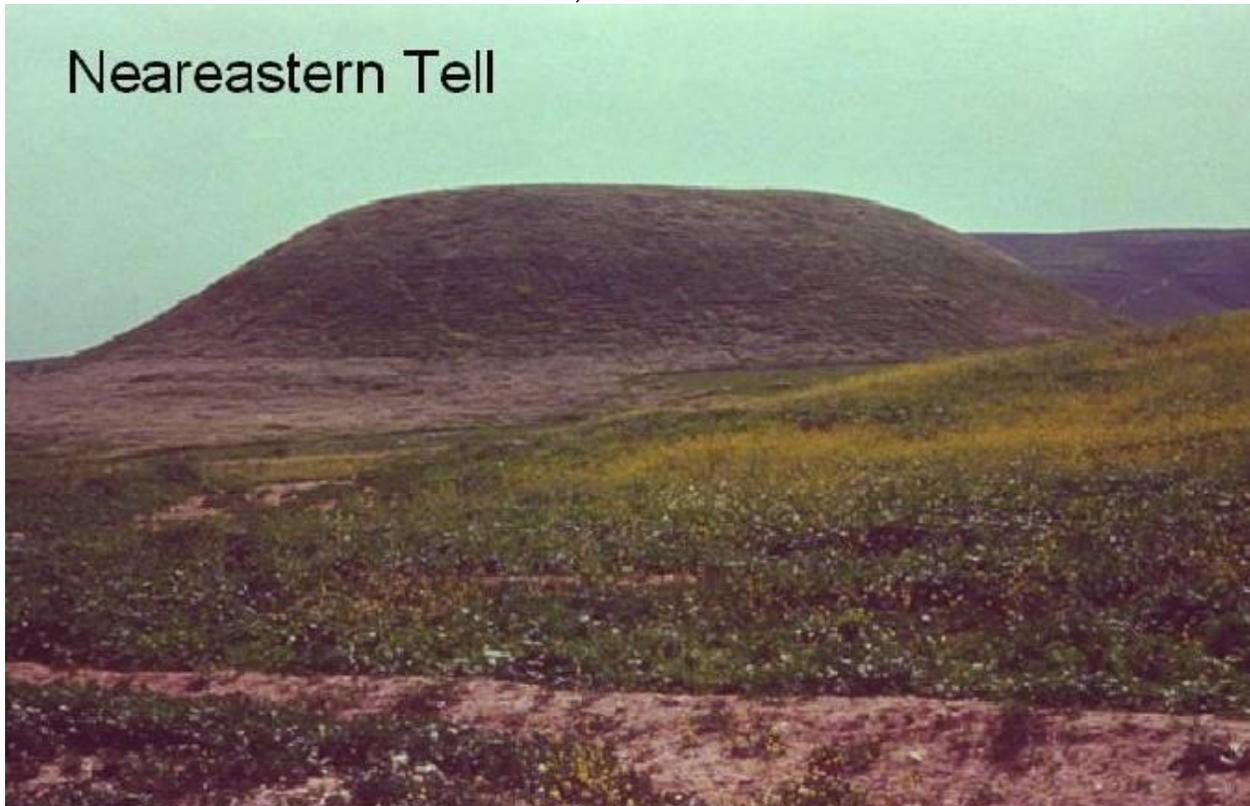
## CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY

Biblical archaeology, like all fields of knowledge, is inevitably used to further an ideology. Archaeological facts rarely speak for themselves. However, if you keep talking about the artifacts long enough, the artifacts will, eventually, start speaking to you. That is, of course, if you are really willing to listen, ideological persuasions notwithstanding.

### ARCHAEOLOGICAL METHODS

Archaeology is based on the principle of stratigraphy. It assumes that mounds containing the remnants of a series of destroyed cities ("tell", or "tel"), or other remains of human activity, record a succession of occupations with younger stratum deposited upon older ones (see expanded discussion, below).

PHOTO LINK: BA032 Near eastern Tell; BWP: BA-023



**BWP:BA23 Photo by Zev Radovan**

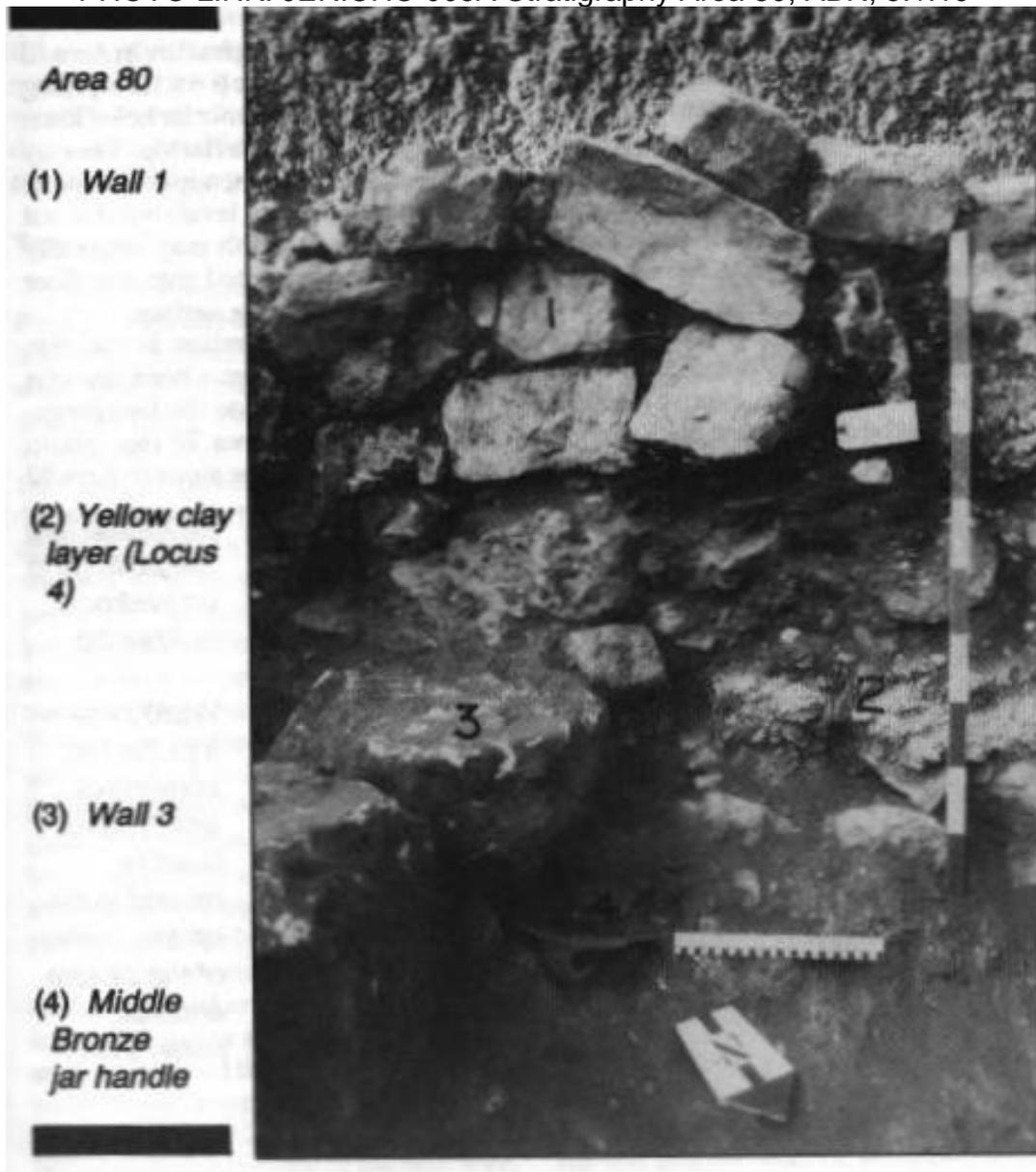
PHOTO LINK: BA033 Aerial View of Tell: Iron Age Tel Batash (Biblical Timnah), BWP: BA-33



BWP:BA33 Photo by Zev Radovan

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PHOTO LINK: JERICHO 005A Stratigraphy Area 80, ABR, 5:1:19



Livingston and Wood, 1992, ABR, 5:1:19

PHOTO LINK: STRATIGRAPHY 001 Hypothetical cross section of a tel; Horeth, 1998:23.

## TEL STRATIGRAPHY

Hoerth, 1998:23

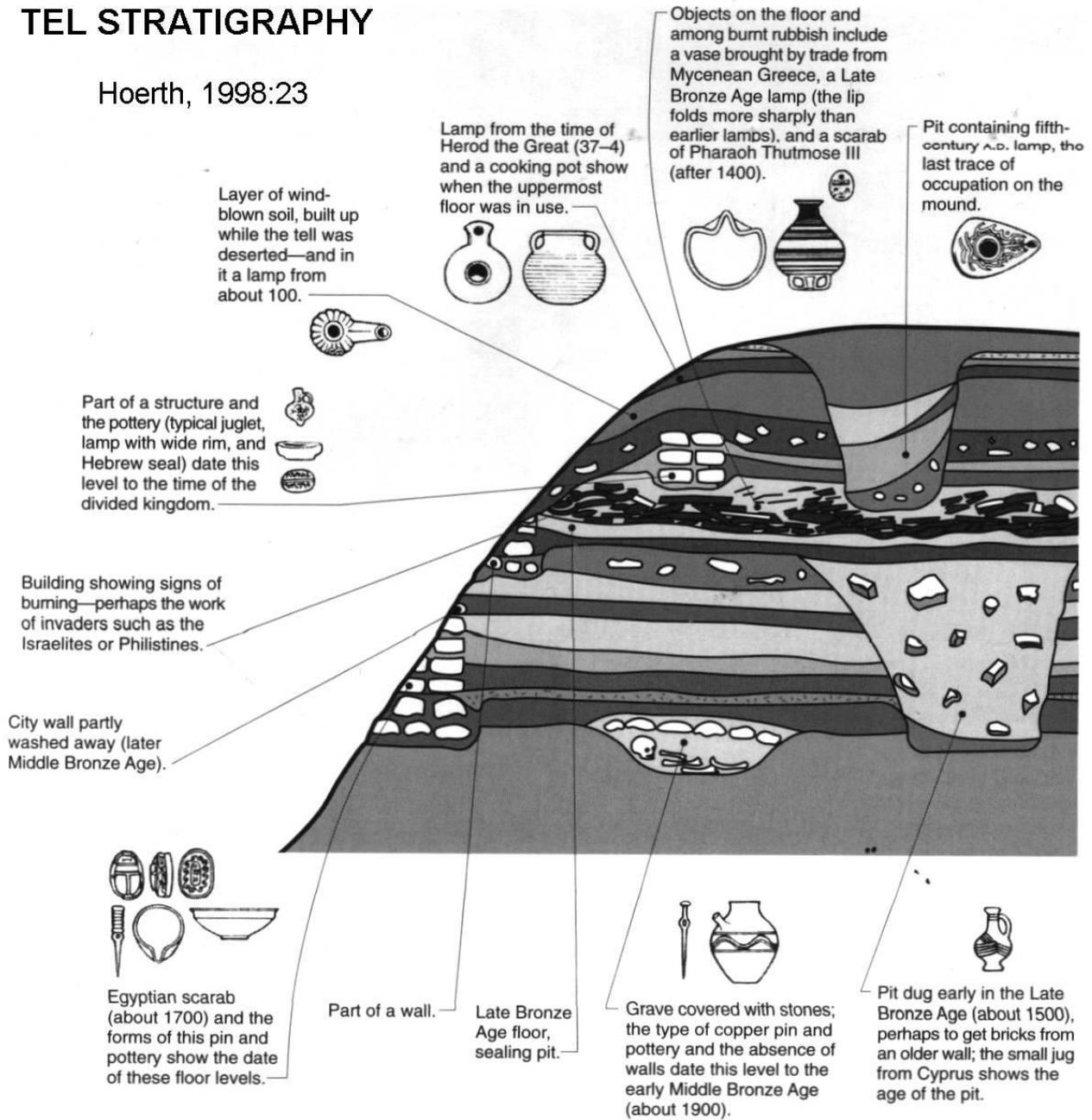
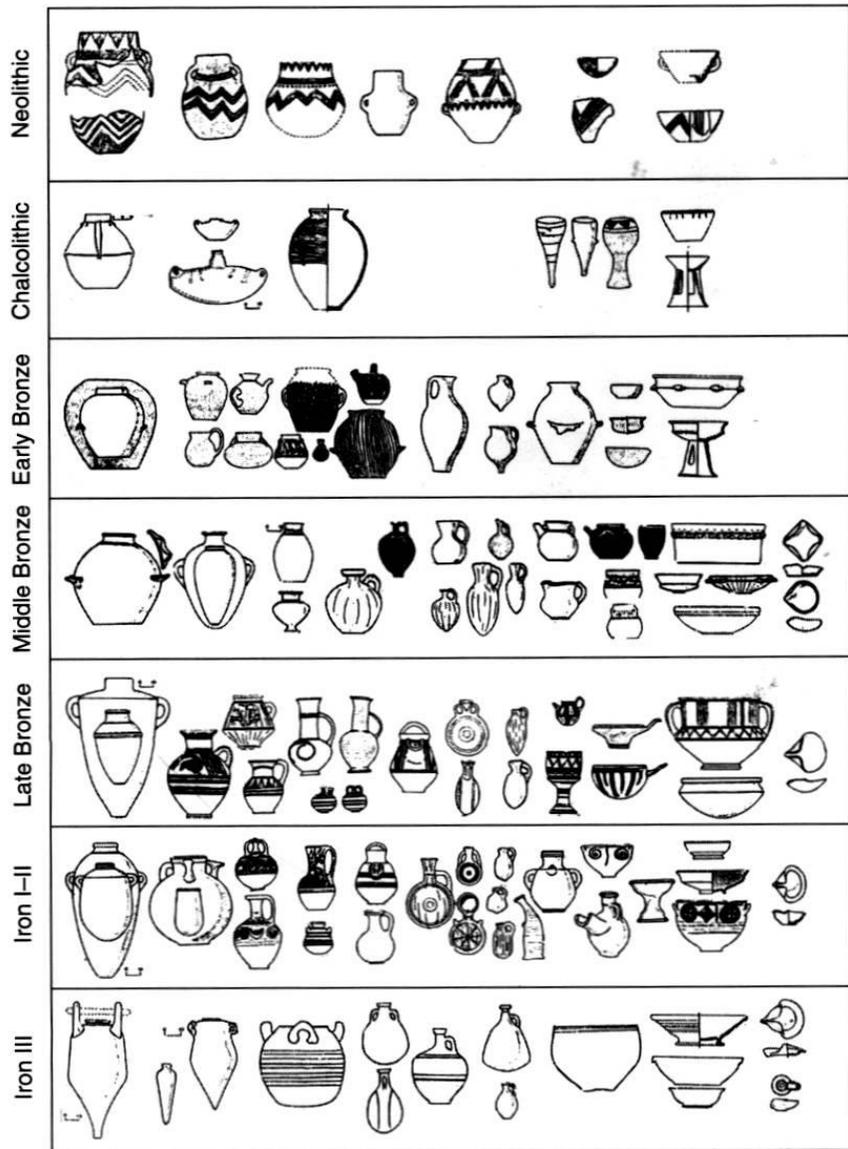


PHOTO LINK: STRATIGRAPHY 002 Pottery Stratigraphy of Palestine; Horeth, 1998:29



**POTTERY STRATIGRAPHY OF PALESTINE**

Hoerth, 1998:29

***Excavations***

As archeological sites are excavated, the setting in which artifacts are uncovered is permanently destroyed. To mitigate loss of information and to collect it in a statistically relevant manner, excavations are made using a series of standard size grids ("balks"). Materials and artifacts are carefully surveyed, photographed, illustrated, numbered, catalogued and described as they are removed from the balks.

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PHOTO LINK: BA039 Transit and rod; BWP, BA-039

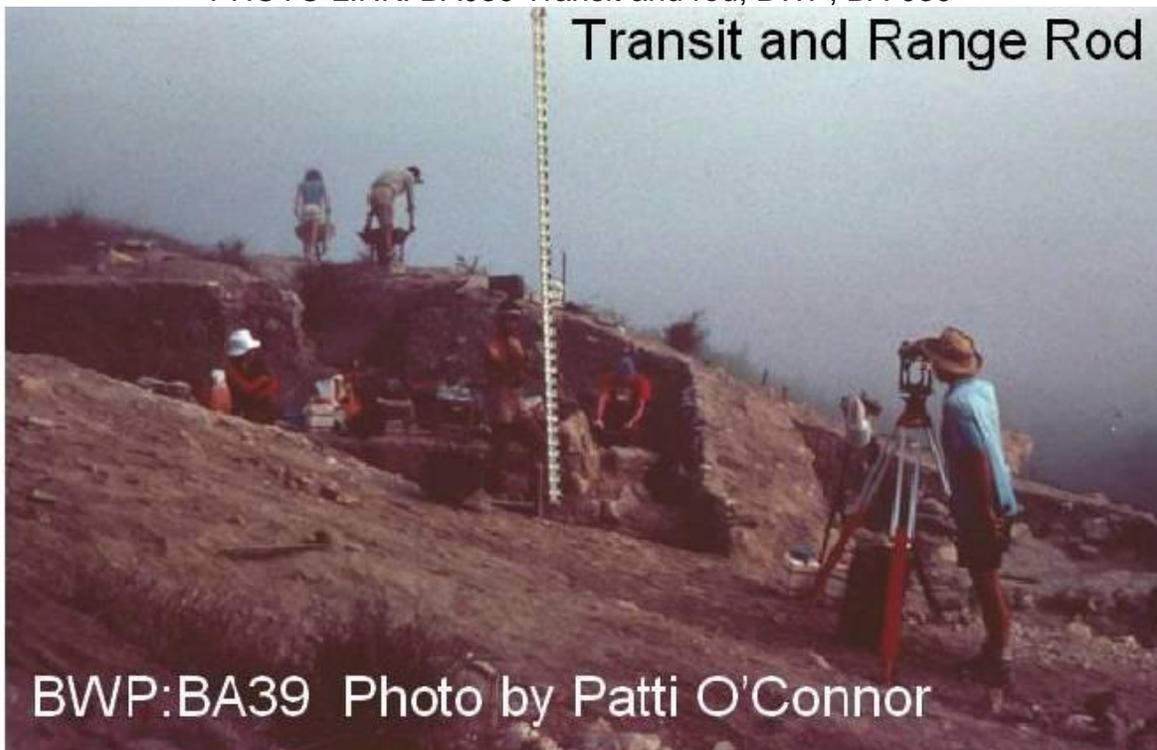


PHOTO LINK: BA034 Excavation Areas in Grid Plan with balks at Gezer; BWP, BA-034.  
Excavation Areas in Grid Plan ("balks") Tell Gezer



BWP:BA34 Photo by Robert Wright

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In the early part of the 20<sup>th</sup> century, early archaeologists excavated huge trenches across tells in search of artifacts. This crude and wasteful technique resulted in loss of a great deal of archaeological data. Modern methods and techniques are much more thorough and selective (they also take more time, labor and money!).

PHOTO LINK: MEGIDDO 008 Map of trench from 1920's and 030's excavations; BAR, 20:1:28



Megiddo excavation trench from 1920's and 1930's. Finkelstein and Ussishkin, 1994, BAR, 20:1:28; Photo by H. Shanks

### ***Pottery***

Each civilization, at different times in its history, had distinctive types and artistic styles of pottery. These distinctive forms are associated with other cultural artifacts (weapons, clothing, food, etc.). Since pottery is generally the most common and durable artifact uncovered by archaeological excavations, it is the primary data used to establish stratigraphies at archaeological sites.

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PHOTO LINK: BA036 Use of small hand trowel; BWP, BA-036.

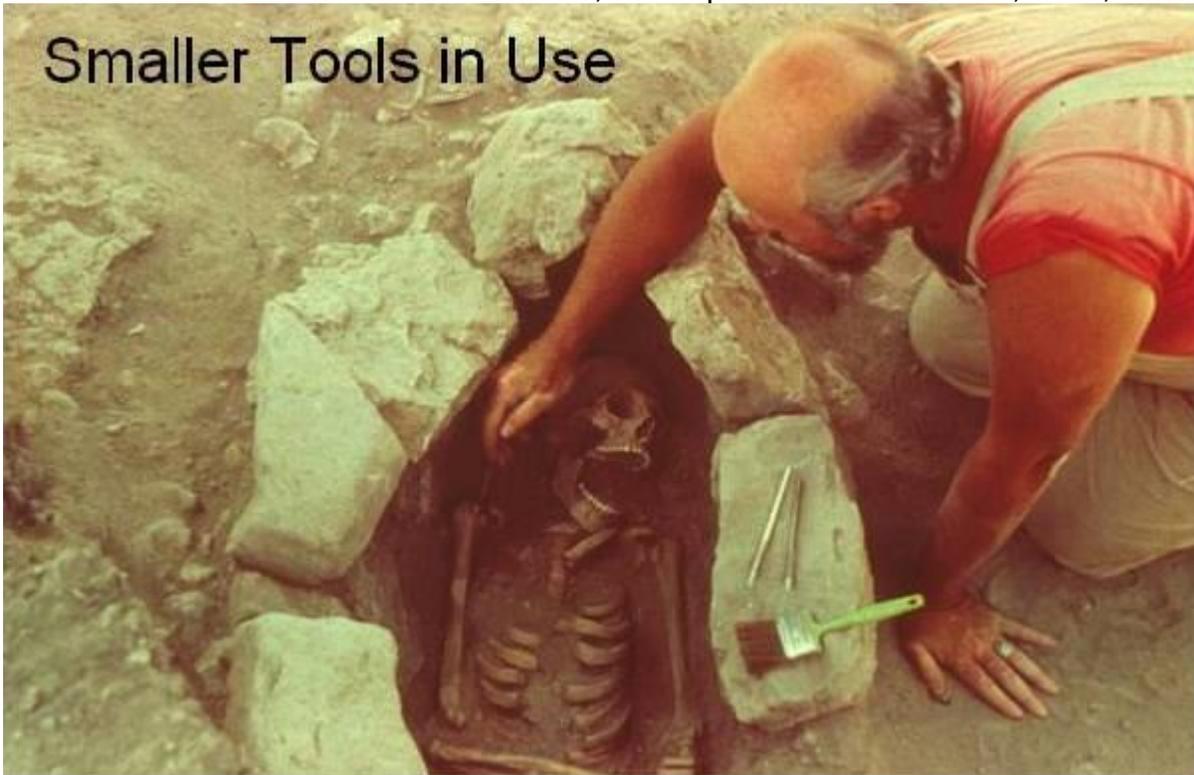
Photo by Patti O'Connor



Small tools in use. BWP: BA 36

PHOTO LINK: BA037 Use of smaller tools; dental pick to clean skeleton; BWP, BA-037

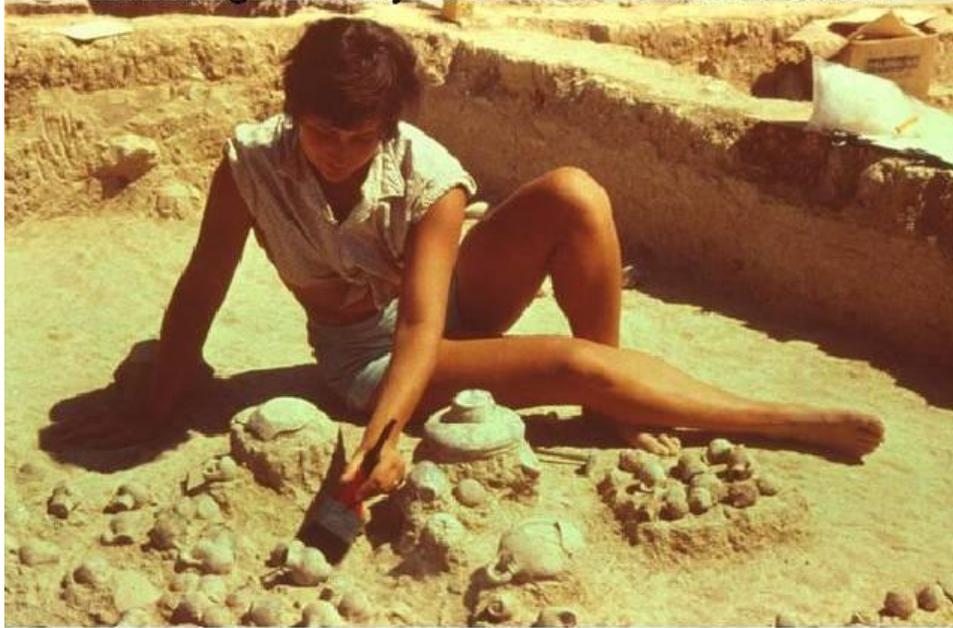
Smaller Tools in Use



BWP:BA37 Photo by Patti O'Connor

PHOTO LINK: BA040 Uncovering pottery with brush; BWP, BA-040

### Uncovering Pottery on Surface with Brush



BWP:BA40 Photo by Zev Radovan

PHOTO LINK: BA041 Washing pottery; BWP, BA-041

### Washing Pottery



BWP:BA41 Photo by Zev Radovan

PHOTO LINK: BA042 Registering-recording pottery; BWP, BA-042.  
**Registering Pottery**



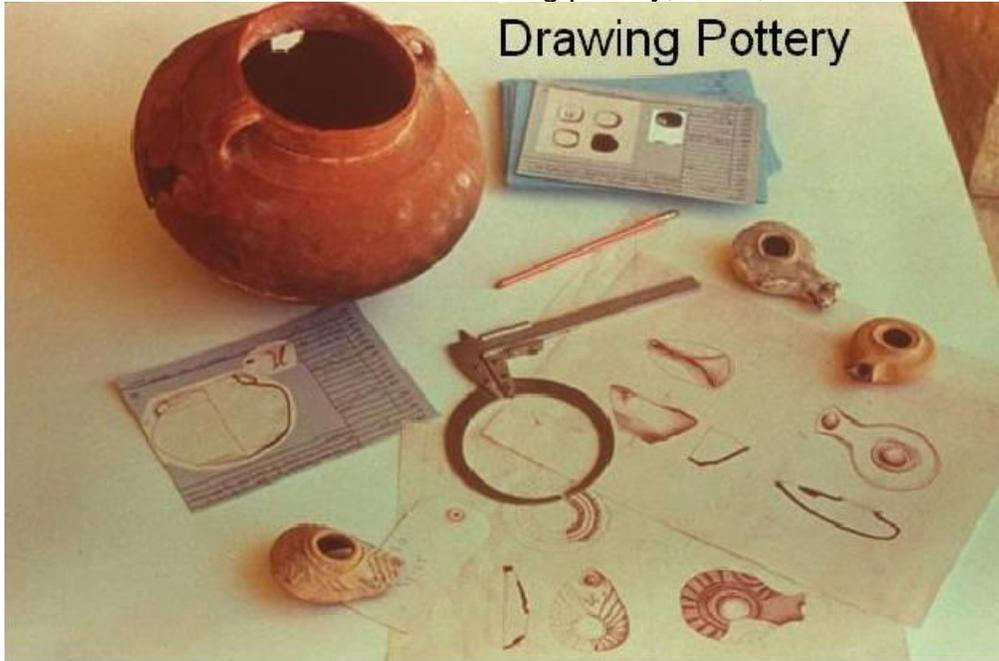
**BWP:BA42 Photo by Zev Radovan**

PHOTO LINK: BA043 Restoring pottery, BWP, BA-043  
**Restoring Pottery**



**BWP:BA43 Photo by Zev Radovan**

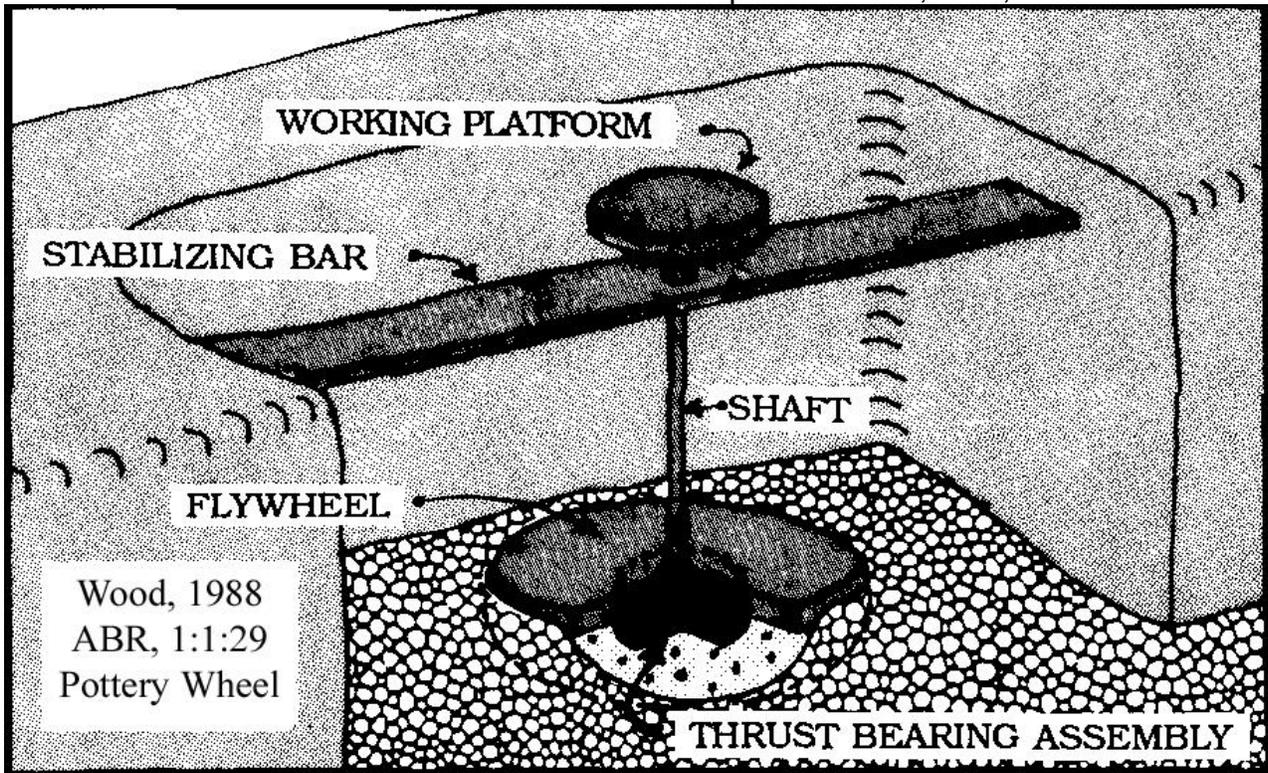
PHOTO LINK: BA044 Drawing pottery; BWP, BA-044



Drawing Pottery

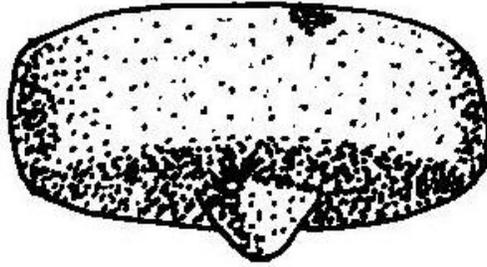
BWP:BA044 Photo by Zev Radovan

PHOTO LINK: POTTERY 001 Schematic potters wheel; ABR, 1:1:29

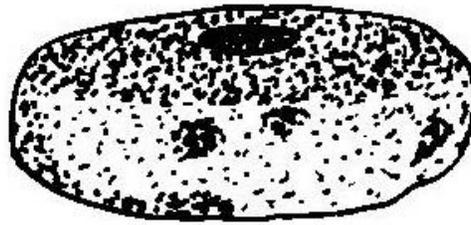


Wood, 1988  
ABR, 1:1:29  
Pottery Wheel

PHOTO LINK: POTTERY 002 Drawing early potters wheel; ABR, 1:2:28



Wood, 1988, ABR, 1:2:28



**Early Potters' Wheels**

PHOTO LINK: POTTERY 003 Schematic pottery kiln. ABR, 1:1:31

Wood, B., 1988, ABR, 1:3:31

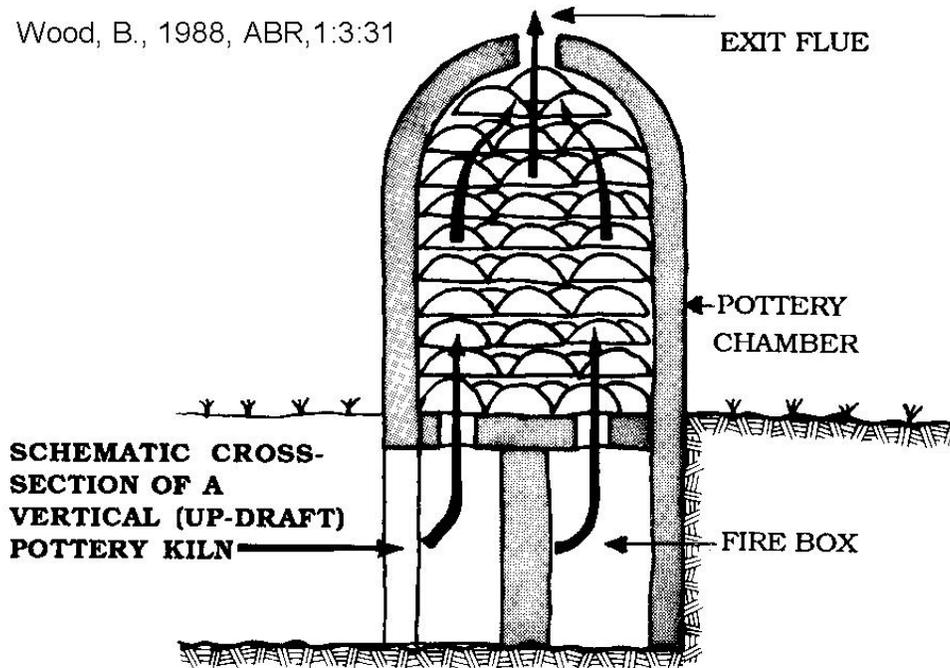
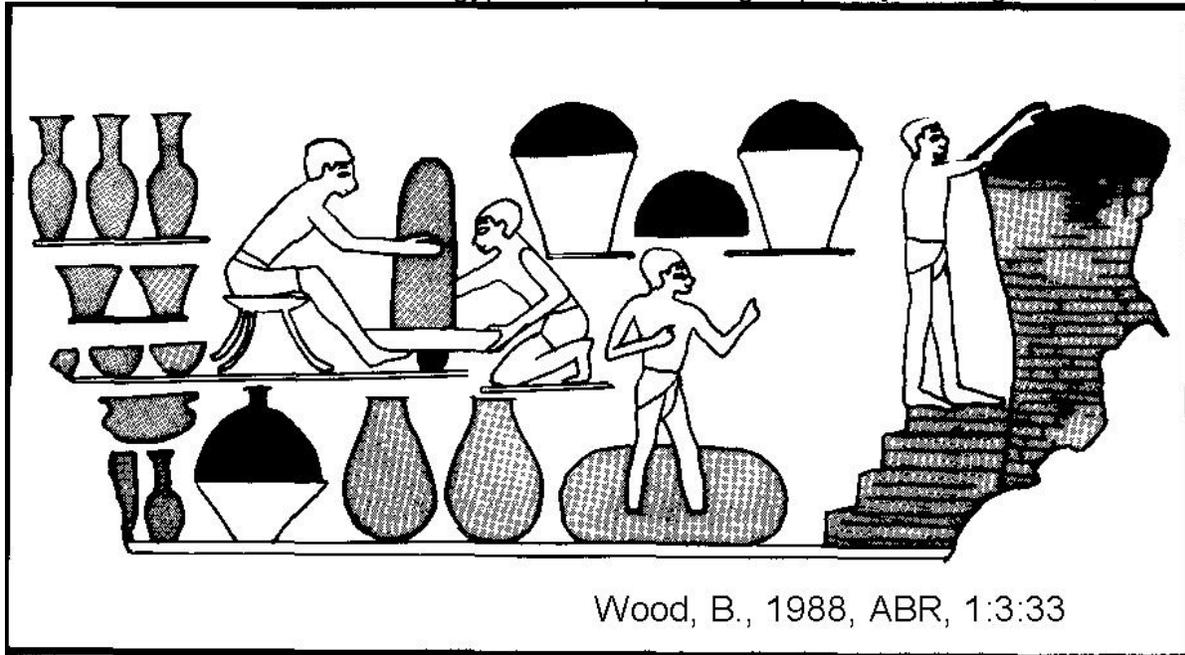


PHOTO LINK: POTTERY 004 Egyptian tomb painting of pottery making; ABR,1:3:33.



Egyptian tomb painting showing a pottery workshop in the time of the Eighteenth Dynasty (late 15th - early 14th century BC). The potter sits at a simple wheel fashioning a vessel from a conical lump of clay. An assistant turns the wheel and aids the potter with the clay. Behind the potter are rows of vessels, probably newly formed and in the process of drying. In the foreground another assistant kneads clay with his feet, preparing it for the potter. Beside him are two large jars, probably containing water to be mixed with the clay. In the background are two baskets containing reddish material, possibly prepared clay, and a pile of the same material is on the floor. To the right of the scene a worker seals the top of a kiln, probably in preparation for firing. (After N. G. Davies, *The Tomb of Kenamun at Thebes*, The Metropolitan Museum of Art, 1930, Pl. 39.)

Examples of pottery from different Archaeological periods in an idealized sequence of strata are illustrated above.

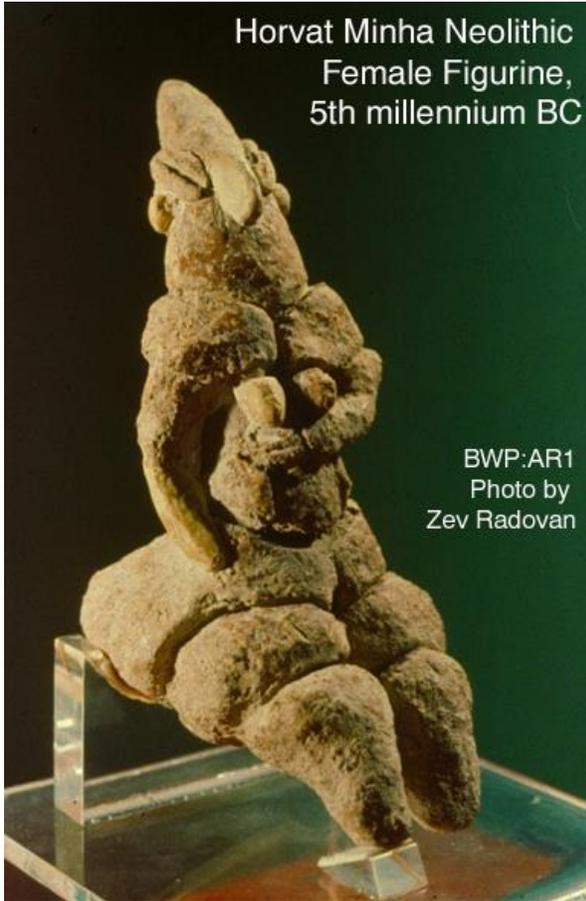
[PHOTO LINK: STRATIGRAPHY 001 Cross Section through hypothetical tell \(see above. P. 7; ctrl+click to follow link\)](#)

[PHOTO LINK: STRATIGRAPHY 002 Table of characteristic pottery types by archaeological period \(see above. P.8; ctrl+click to follow link\)](#)

## Neolithic

Neolithic means “new stone.

PHOTO LINK: AR001 Horvat Minha Neolithic Female Figurine, BWP, AR-001



This schematic rendering of a female figure, found at Sha'ar ha-Golan in the Jordan Valley near the mouth of the Yarmuk River, dates from the same approximate period in the Neolithic Age as the Horvat Minha figurine (see AR1: Horvat Minha Neolithic Female Figurine). The site was excavated by Moshe Stekelis from 1943 to 1952. Since the first sites with materials from this period were discovered clustered near the Yarmuk River, the culture came to be called Yarmukian, although we now know that its settlements spread through the entire Jordan Valley. Only an acutely conical head and upper torso are represented here, shown with the hands folded in front. This is one of a large number of figures found at the site, most made from river pebbles but some made from local clay. Some were painted with red mineral pigment. In very schematic style they represented human figures, mostly female. Among them were also some renderings of the human genitalia, both male and female (Caption, AR001)

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Female figure, from Sha'ar ha-Golan (Jordan Valley near the mouth of the Yarmuk River)

5th  
millennium  
BC



BWP:AR2; Photo by Zev Radovan

PHOTO LINK: AR002 Sha'ar ha-Golan, Neolithic Female Figurine (LEFT); BWP, AR-002

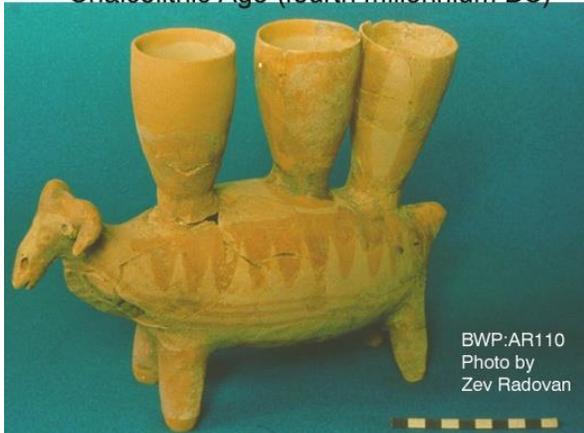
During the Chalcolithic Age, in the fourth millennium, a culture subsisting mainly on goat herding and agriculture emerged on the Golan Heights east of the Sea of Galilee. It has been detected in over 25 settlements. A number of pillar-form figures carved from the local basalt have come to light. They vary slightly in detail, but most show features similar to this example. Although the figure is basically in the shape of a cylindrical vessel stand, it has been given facial features: a prominent nose, eyes close-set on either side and knoblike protrusions representing ears. Each of the pillar-shaped figures has a shallow concavity on the top, suggesting a miniature mortar for grinding grain. Perhaps they were used for token offerings of grain to an agricultural god.

## Chalcolithic

Chalcolithic means “copper stone.” In the Middle East, the Chalcolithic Period ended c. 3250 BC

PHOTO LINK: AR110 Chalcolithic Gilath, Ram with Goblets; BAR, AR-110.

Gilath northern Negev, Ram with Goblets  
Chalcolithic Age (fourth millennium BC)



Found in a 17th-century B.C.E. tomb at Jericho, this uniquely shaped vessel was probably used for libations. But is the head depicted on its bowl that of a god or does it portray some bearded Canaanite nobleman? The beard and pronounced nose are similar to contemporary and later Egyptian representations of Canaanite kings. Perhaps this was a fancy goblet made specially for the use of some lord of Jericho and eventually placed with him in his tomb.

CHALCOLITHIC FEMALE FIGURINE  
GILATH, 4000-3100 BC



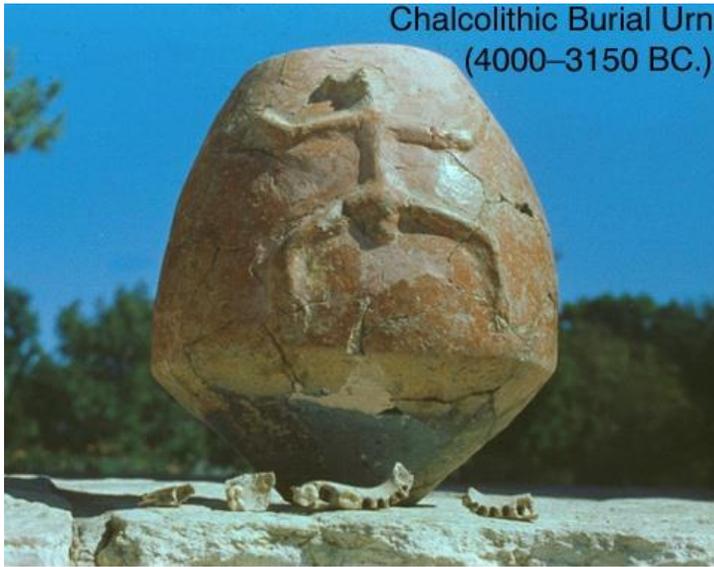
BWP"BA90; Photo by Zev Radovan

PHOTO LINK: BA090 Chalcolithic Female Figurine, Gilath, 4000-3100 BC (LEFT); BWP, BA-090.

This curious clay figurine, about twelve inches high, was found at a settlement of the Chalcolithic Age (4000–3100 B.C.E.) in the northern Negev desert. The female figure is seated on a pedestal and holds on her head a milk churn—a miniature of the pottery churns characteristic of this period. The excavator of the site, David Alon, has suggested that this figure may represent a form of Ashtaroth as the goddess of flocks and milk, not only because of the milk churn on her head, but also because of her accentuated sexual organs. Furthermore, the figurine was found together with several apparently ritual objects (such as the ram with goblets shown on BA97: Chalcolithic Ram with Goblets, Gilath).

The horizontal lines painted on the woman's body may be meant to represent a light cloth garment or may be a tattoo decoration. The vertical curved lines between her eyes and ears are continued onto the back of her head and probably represent braided hair. She appears to hold a vessel in the shape of a small pedestal or censer under her left arm (Caption to BWP:BA90)

PHOTO LINK: GA015 Chalcolithic Burial Urn; BWP, GA-015.

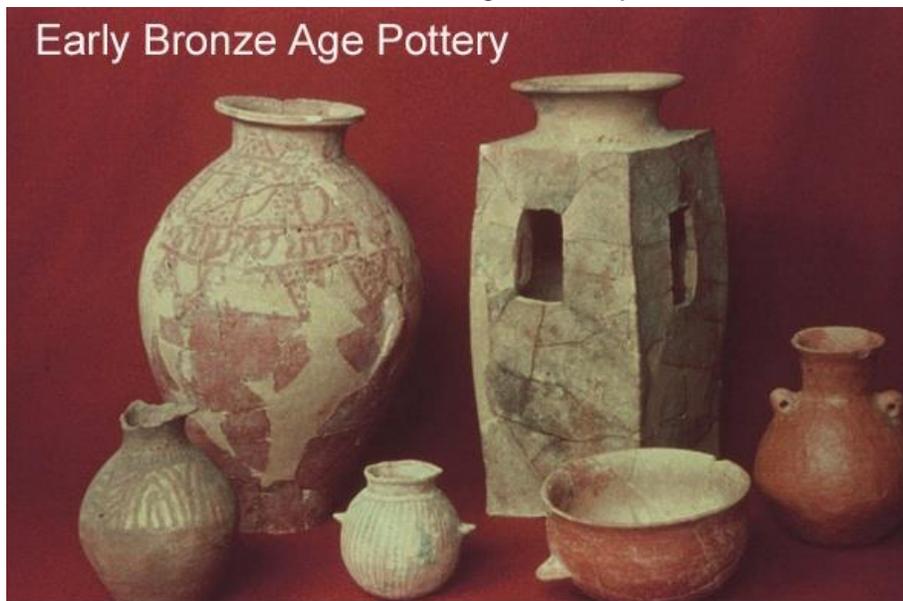


BWP:GA15; Photo by Picturepoint

During the Chalcolithic period (4000–3150 B.C.E.), reburials sometimes took place in large urns or ossuaries (a Vessel for reburial of bones), such as this one from the Hazorea Archaeological Museum in western Galilee. Often infants were buried beneath the floors of houses as though the family wanted them close by the living members of the household. The top of this urn has a large, open mouth so that the skull can fit into it. The figure of a human being is modeled in relief on one side. In front of the urn are the remains of a jaw that were found in it (Caption GA:015)

## Early Bronze Age

Photo Link: BA123 Bronze Age Pottery. BWP, BA-123.



BWP:BA123; Photo by Zev Radovan

To give some indication of the changing ceramic styles during the Biblical epochs, the following slides illustrate the pottery vessel shapes and decorative treatments typical of different periods. (For a statement on the importance of pottery typology for archaeological dating, see caption for BA40: Uncovering Pottery on Surface.) These vessels from the Early Bronze Age (third millennium B.C.E.) show several features typical of the period: Flat bases, simple flaring rims, ledge handles at the wide part of the

body or small loop handles on the shoulder, glossy red burnished decoration covering the entire body or flat red or brown painted patterns. All pottery vessels were still made by hand—the fast pottery wheel had not yet been invented. All but one of these vessels is of a common every day domestic shape. The large receptacle with the window-like holes, however, is an incense burner (Caption, BWP:BA123)

## Middle Bronze Age

PHOTO LINK: BA124 Middle Bronze Age pottery; BWP, BA-124.

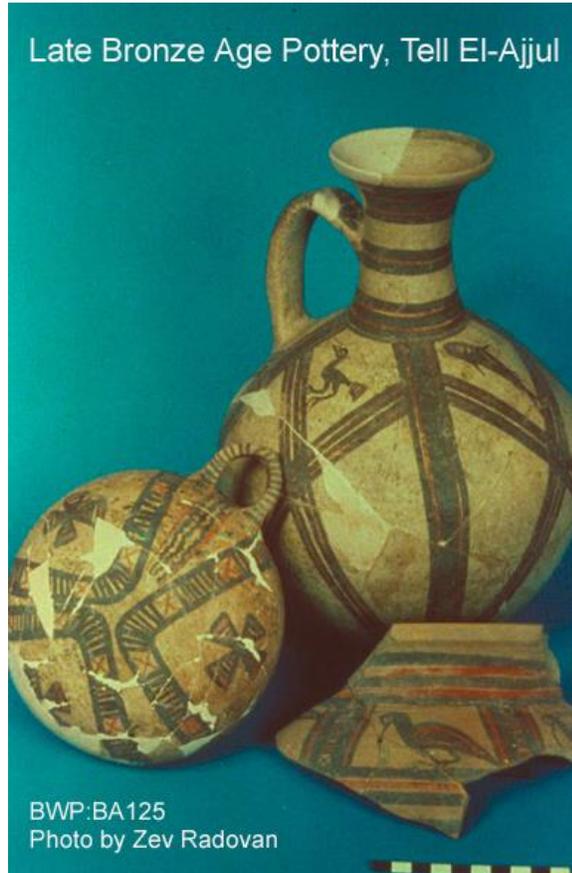


BWP:BA124; Photo by Zev Radovan

The pottery of Middle Bronze I (21st–20th centuries B.C.E.) shows a sharp break with the ceramic traditions of the preceding Early Bronze Age. The ware is consistently a lusterless greenish-gray, perhaps reflecting both a change in taste and in pottery-firing techniques. The shapes are spherical or resemble barrels. The bases are broad and flat and the flaring rims rise from necks which form a definite angle with the body. Handles are rare, painted decoration is even rarer; instead, a few horizontal or wavy incised lines decorate the shoulder of the vessel. One new type of vessel, a shallow four-spouted lamp seen in the foreground, was introduced in the MBI period. Olive oil was placed in the bowl and a flax wick was laid in one or more of the pinched spouts. The emergence of this pottery in Canaan corresponds to widespread disruption of earlier settlement patterns and has been associated by some scholars with the arrival of the Amorites in the land. (Caption, BWP:BA:124)

## Late Bronze Age

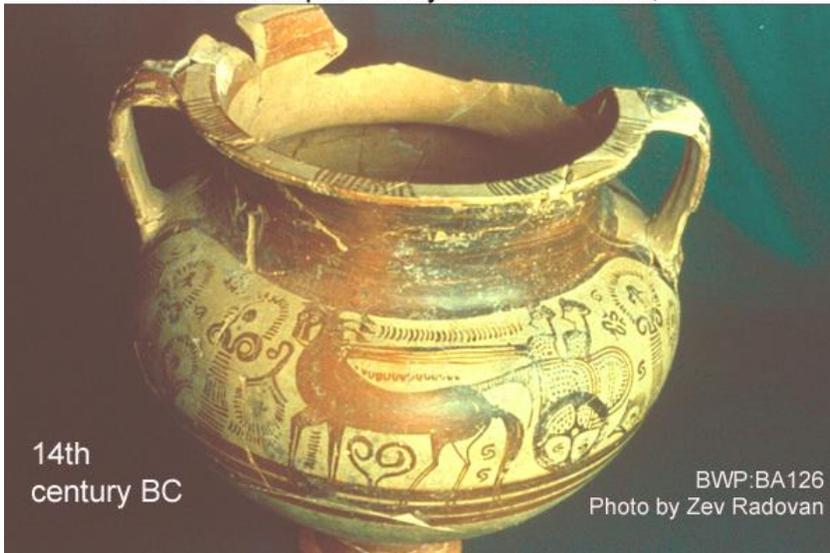
PHOTO LINK: BA125 Late Bronze I Age pottery, Tell el-Ajul; BWP, BA-125.



With the introduction of the fast wheel in Middle Bronze II (19th century B.C.E.) finely made pottery with relatively thin smooth walls appeared and remained normative for succeeding periods. These Late Bronze I (16th–15th centuries) vessels from Tell el-Ajjul show new shapes and intricate red and black bichrome painted decoration. The heron-like ibis was a sacred bird in Egypt. Both the ibis and the dolphin are common in the contemporaneous art of Cyprus and the Aegean cultures (Caption, BWP:BA125)

PHOTO LINK: BA126 Late Bronze II Age imported Mycenaean Krater, Tel Dan; BWP, BA-126.

Late Bronze II Imported Mycenaean Krater, Tel Dan



This imported Mycenaean Krater of the 14th century B.C.E. was found in a tomb at Tel Dan. It is an unusually large and fine example of the Aegean potters' craft. Numerous smaller Mycenaean vessels have been found at many 14th century sites stretching from Phoenicia southwest to Egypt.

Some vessels may have initially traveled eastward

containing Mycenaean luxury export commodities. A frequently found vessel in the eastern countries, for instance, is a small juglet with "stirrup" shaped handles and a pouring spout on the shoulder. It may have been used to transport aromatic scented with rose or thyme, treasured specialties among the Mycenaeans' wares to judge from the records preserved on tablets in their own Linear B script. However, the presence of other kinds of vessels, such as this one, indicates that the highly skilled Mycenaean potter's products were also admired for their own sake.

Large common Canaanite store jars are found from this same period at Mycenaean sites as far away as Mycenae itself. Apparently the people of Canaan were exporting agricultural goods—wine, grain or ordinary olive oil—to pay for their luxury imports. The presence of particular pottery forms can thus sometimes reveal patterns of trade and culture (Caption, BWP:BA126).

PHOTO LINK: ESN112 Naturalistic Coffin Lid; Deir el-Balah, Late Bronze Age; BWP, ESN-112

## Anthropoid Coffins on Display Deir el-Balah



13th century BC

BWP:ESN112; Photo by Sisse Brimberg, ©National Geographic Society

Anthropoid coffins from Deir el-Balah are on display in the Israel Museum in Jerusalem. They were collected by the late General Moshe Dayan. As is clear in this slide, a number of them have been restored. Dothan divides the coffins into two groups, based on the outline of the lids and coffins. The most common group at Deir el-Balah is mummy-shaped, with the head and shoulders clearly delineated in a variety of proportions and silhouettes (second from left). Far less frequently found at Deir el-Balah is the second group, in which the head and shoulders are not delineated (far right, foreground). This is the dominant type of pottery coffin in Egypt and the only shape previously known from Canaan.

Dothan distinguishes two basic coffin-lid groups: naturalistic and grotesque. The former, shown here, dominated at Deir el-Balah. Only in the naturalistic category is the facial outline delineated, whereas it is not defined in the grotesque category. In the latter, the features are applied to the surface without outlining the face. Naturalistic lids were usually molded with facial features and then applied to the coffin. Coffins were produced by the coil technique; a rope of clay was wound into the shape desired and then smoothed into a continuous surface. After the coffin was formed, when the clay was leather-hard, the lid was cut out, thus assuring a perfect fit. At this stage the facial features were applied or the face mask, prepared separately, was affixed. The artisans who produced these coffins devoted much greater care to the finishing and firing of the lids than to the body of the coffin. All of the Deir el-Balah coffins are large, ranging in height from 5 to 6.5 feet with a circumference of about 5.5 to 7.5 feet at the widest point. They were fired at low temperatures, so that the clay is brittle. They were, undoubtedly, made locally (Caption, BWP:ESN112)

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PHOTO LINK: POTTERY 024 Canaanite pottery Late Bronze Age, 1550-1200 BC; BAR, 22:5:32.

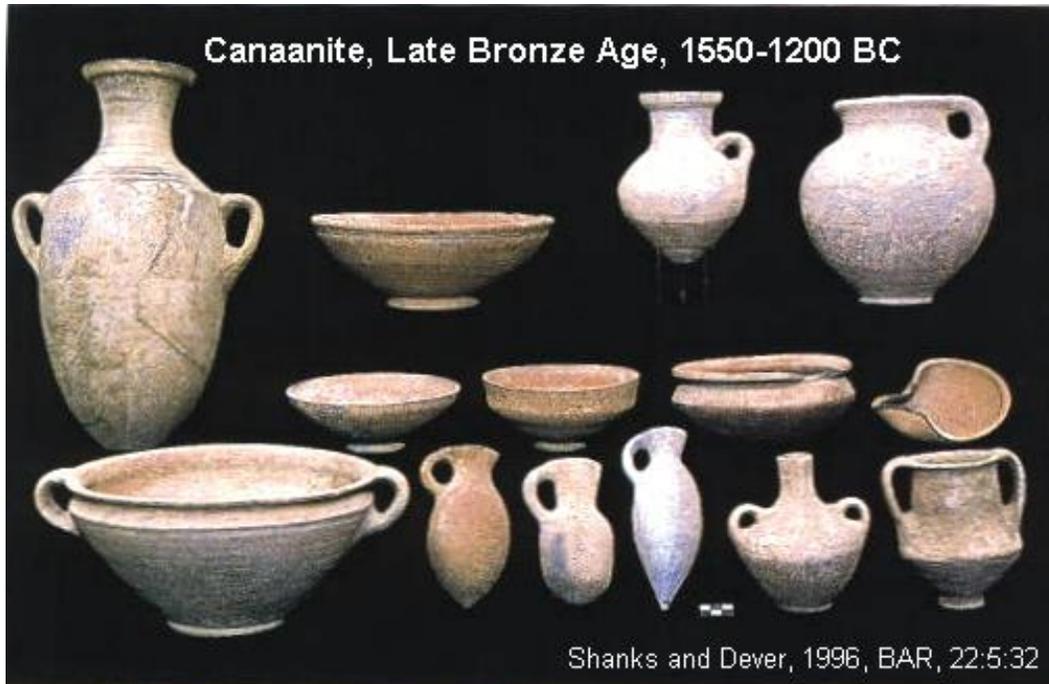


PHOTO LINK: AR007 Late Bronze Age Stylized Female Figurines; BWP, AR-007.



By the time the Canaanite figurines shown here were made in the latter part of the Late Bronze Age (14th and 13th centuries B.C.E.), several different types of goddess figures are found at various sites throughout Canaan. The type represented by these two examples, now in the Israel Museum, is one of the more extremely stylized. The head has exaggerated ears, pierced for earrings; the nose is pinched into the shape of a birdlike beak; the arms are only vestigial appendages. The navel is punctated (that is, marked with small holes or depressions), as are, at times, the breasts. We can trace this type back to predecessors in third millennium northern Mesopotamia; apparently they were brought to Syria, Canaan, Cyprus and on into Egypt in the second millennium B.C.E. These figurines most probably represent some aspect of either Asherah or Astarte, the two major goddesses of the Canaanite pantheon (see further at AR24: Tel Batash, Iron Age II Female Figurine Mold), but we cannot be certain which one. As new cultural groups adapted the

gods and myths of earlier periods to their own traditions, distinctions among the several qualities and powers associated with the gods of earlier myths sometimes became blurred and the names mixed. As with some of the figures shown in earlier slides, we cannot be certain whether these figurines were primarily made to be presented as offerings to the goddess at a public shrine, to be kept in the home as “household gods” or to be worn on the person as amulets (Caption, BWP; AR007).

## Iron Age I

PHOTO LINK: AR018 Tel Batash, “Cyrano” male head, Iron Age I (RIGHT); BWP, AR-018.

Tel Batash is a city mound a few miles south of Gezer in the Shephelah, the foothills bordering the coastal plain. Excavations there during the late 1970s through the 1980s, led by George L. Kelm and Amihai Mazar, have confirmed that the site is ancient Timnah, a city ruled by the Philistines during the time of Samson’s exploits (Judges 14). (This Timnah should not be confused with the Timna of AR16: Timna, Gilded Serpent.) This curious male head, quickly dubbed a Philistine “Cyrano,” was found in an Iron Age I, 11th-century B.C.E. context—contemporary with the general period of Samson. It is only 2 inches high, decorated with red paint on its prominent

nose, cheeks and around its neck. The flattened head is similar to the treatment of the female Ashdoda head on the AR17: Ashdod Ashdoda” Chair Figure and of the heads on some late Mycenaean clay deities. The nose is quite similar to some late Mycenaean examples, both of deity figures and of humans (such as the soldiers on the famous Warrior Vase of a century or so earlier found at Mycenae). Is this a portrayal of a male god as envisioned by Philistines who were still viewing their world through Mycenaean-trained eyes?

(Caption, BWP: AR018).

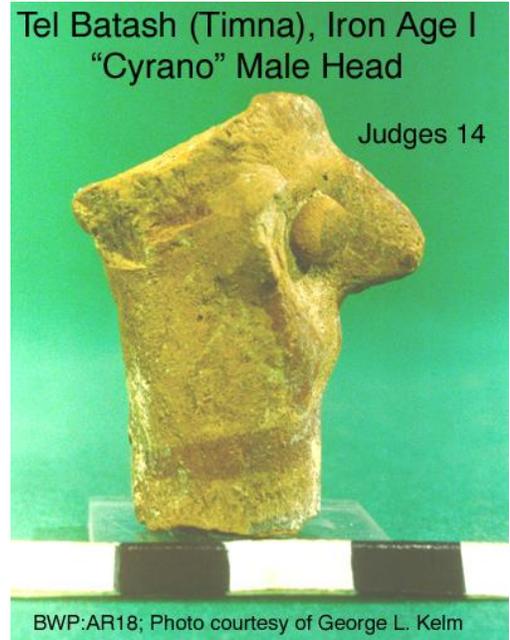


PHOTO LINK: AR104 Beth Shean Iron Age I ceramic cult stand with serpents; BWP, AR-104.

### Beth-Shean, Ceramic Cult Stand with Serpents, Iron Age I Temple

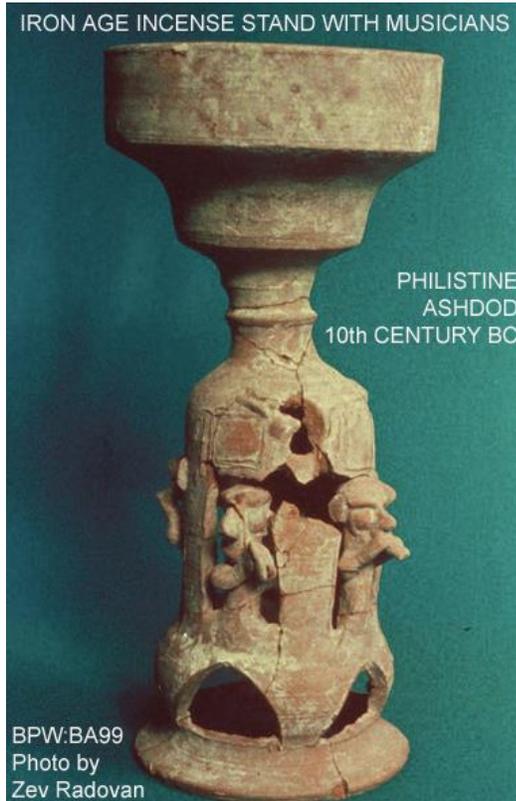


On this cylindrical pottery vessel, found in an Iron Age I temple at Beth-Shean, serpents coil, poised to strike at birds perched in the windows. Birds are also perched on the two handles.

This may have served as a stand on which to place a bowl. Based on ancient pictorial evidence, however, some vessels such as this appear to have served as cultic flower pots for agricultural fertility rituals; seeds planted within them sprouted as the cylinders received water libations. Such a ritual may be what the prophet Isaiah later condemned (Isaiah 17:7–11). Images of serpents and birds are common to Beth-Shean. LaMoine DeVries has suggested that on this vessel “the dove, regarded as a harbinger of spring, perhaps represented the fertility goddess Ashtoreth, often described as the ‘divine courtesan,’ while the serpent was sometimes associated with chthonic deities [gods of the underworld] and may symbolize the season of death, winter” (Caption, BWP:AR104).

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PHOTO LINK: BA099 Iron age incense stand with musicians Philistine Ashdod; BWP; BA-099.



This incense stand from 10th century B.C.E. Philistine Ashdod shows five musicians playing from windows in the lower portion of the stand. The musicians seen here play a double flute and cymbals. The others include another double flute player, a lyre player and a tambourinist. The scene is reminiscent of the band of “prophets” described in 1 Samuel 10:5–11 whom Saul joined in ecstatic dance accompanied by the same kinds of instruments. We also are reminded of the instrument playing Levitical choir in Solomon’s Temple (2 Chronicles 5:12–13). Many of the simple incense stands found from this period also have holes resembling windows. It may be that the incense stands were intended to symbolize the shrine building and that the figures are, indeed, models of a cult musical band (Caption BWP: BA099).

PHOTO LINK: BA128 Iron Age I Philistine pottery, Ashdod; BWP, BA-128.

### Iron Age I Philistine Pottery, Ashdod



A distinctive type of pottery is found at sites along the southern coast of Palestine from the 12th and 11th centuries B.C.E. Almost all scholars agree that this pottery was produced by the Philistines who had already settled there by the early 12th century.

As these examples from 12th century Ashdod illustrate, the pottery’s painted decoration is clearly derived from that of late Mycenaean painted

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pottery. The vessels are a mixture of shapes borrowed from the Mycenaean culture and other shapes which are local Canaanite in origin. For instance, on the right of the photo, the bowls with horizontal loop handles are of a classic Mycenaean form. In the center, on the other hand, the so-called “beer-mug” with the strainer-spout derives from a Late Bronze II Canaanite form. In the 12th century, the decoration on both kinds of vessels was composed of geometric patterns such as diamonds, chevrons, concentric circles or stylized figures such as the bird shown here, designed in panels on the upper half of the vessel bodies. The decoration was set off by multiple vertical and horizontal lines, all in black and red paint on a white slip background. This style of decoration is extremely similar to a kind called “close style” found on Mycenaean pottery of the 12th century B.C.E. (Mycenaean III C). It seems clear that the Philistines either originated in the Aegean themselves or made a wholesale appropriation of the Mycenaean pottery traditions they encountered on the way to their new homeland in Canaan.

PHOTO LINK: BA127 Iron I Pottery, 12th-11th centuries BC, Gezer; BWP, BA-127.



Several characteristic shapes and decorations of Iron I (12th–11th centuries B.C.E.) pottery are shown together here. The different pottery can each be traced back to Late Bronze Age traditions, but are recognizably different in this later period.

The wide bowl from Gezer in the center background, displays a stylized palm tree on its inside. That decoration is a variation of another which

had been used earlier and then abandoned. The two small jars at the side adopt the shape of earlier storejars, although their smaller size and decoration appear to be imitating Egyptian glass vials of the period. The two styles of flat “pilgrim flasks” shown here (so-called for their resemblance to canteens and probable function) perpetuate a popular Late Bronze shape but have incorporated alterations in the treatment of handles, mouths and decoration. All of the vessels reflect a decline in the quality of workmanship as compared with that of the Late Bronze Age: Less carefully prepared clay shows stray large grits, more casual finishing of the vessel shapes and a less shiny and smooth surface. The examples shown here are all painted, but most vessels of the period are completely undecorated.

Therefore, while the pottery of Iron I suggests some definite shifts in the cultural climate of Canaan at the end of the 13th century B.C.E., it does not suggest a sharp break with the craft traditions of the preceding era. This agrees with Biblical and other historical records which indicates that the Israelites and other new groups were establishing themselves in the region at that time but did not completely displace the indigenous Canaanite population (Caption, BWP:BA127)

## Iron Age II

PHOTO LINK: AR024 Iron Age II mold for figurine Tel Batash, BWP, AR-024.



Tel Batash (Timnah) fell under Israelite control at the time of David (early tenth century B.C.E.; see 2 Samuel 5:17–25). During the Iron Age II period (ninth to seventh centuries B.C.E.), the city appears to have had a mixed population of Israelites and Philistines and rule of the city changed hands several times.

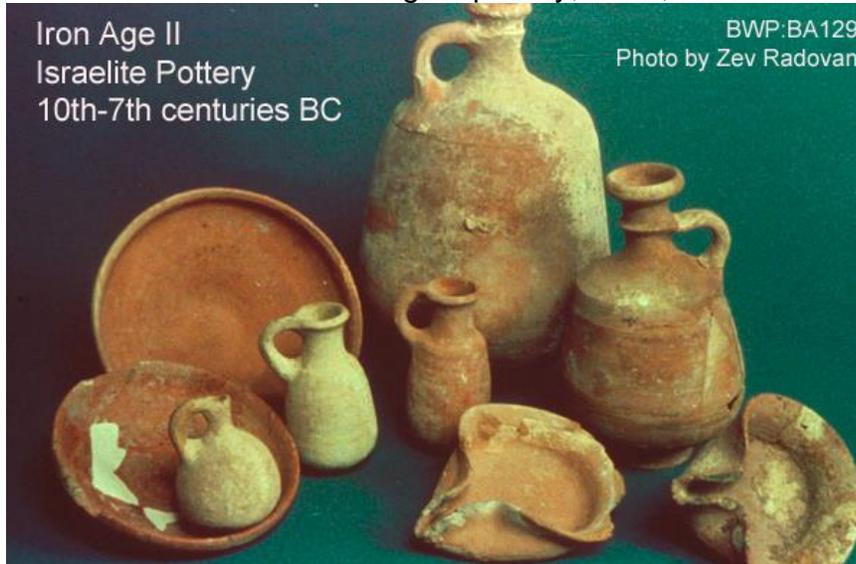
This clay mold, shown with a modern casting, was found in an eighth-century B.C.E. context next to a spot where a cult place was built in the next century (and which therefore may have reused the site of an eighth-century shrine). The seventh-century cult site consisted of a raised plastered mudbrick platform, on which were two painted chalices next to fragments of what may have been standing stones. This and several other clay molds found with it had been formed by pressing clay against original masters, which may have been made from fired clay, or perhaps from wood or ivory. The molds were then fired and used for casting a number of clay duplicates,

which in turn were used either as votives to be left at the shrine or as amulets to be taken away to private homes. Plaque-shaped clay figurines similar to those made from these molds begin to turn up in the Late Bronze Age (15th to 13th centuries B.C.E.) and are frequently found in Iron Age homes. These may be *teraphim*, or “household gods.” Portable *teraphim* are mentioned in biblical accounts—such as in the story of Rachel stealing her father’s household gods (Genesis 31:19)—and appear to have been used by Israelites through the eighth century (see Hosea 3:4). They were not outlawed until Josiah’s reform of 621 B.C.E. (2 Kings 23:24). This Tel Batash mold was based on an unusually fine example of a standard female figure derived from Late Bronze Age prototypes. The nude figure with hands at her sides is similar in stance to earlier examples that usually have been identified as Astarte (see AR6: Gezer, Middle Bronze Age Female Pendants), the Canaanite goddess embodying the more sensuous aspect of female sexuality—the Canaanite “Aphrodite.” By contrast, another Tel Batash mold portrays a nude female with hands supporting her breasts, a type drawn from earlier representations that scholars have tended to identify as Asherah, the Canaanite goddess who embodied the mothering and nurturing aspect of the feminine. What

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identities were ascribed to such figure-types by eighth-century B.C.E. Philistines we do not know. The well-articulated detail in the fertility figurines from Iron Age Tel Batash is surprising considering their late date. A few with similar heads have been found from this period, but they come from Phoenician sites to the north. The Tel Batash molds may reflect a local Philistine tradition that perpetuated earlier forms or they may have been made from originals acquired from Phoenicia (see AR26: Dor, Persian Period “Maternal” Astarte Figurines) (Caption BWP:AR124).

PHOTO LINK: BA129 Iron Age II pottery; BWP, BA-129.



Israelite pottery of the Iron II period (tenth–seventh centuries B.C.E.), tends to be made of coarse ware, fired to a reddish-brown color in most cases and left unpainted. The shapes of the lamps, juglets, jugs and bowls shown here are all characteristic of the period.

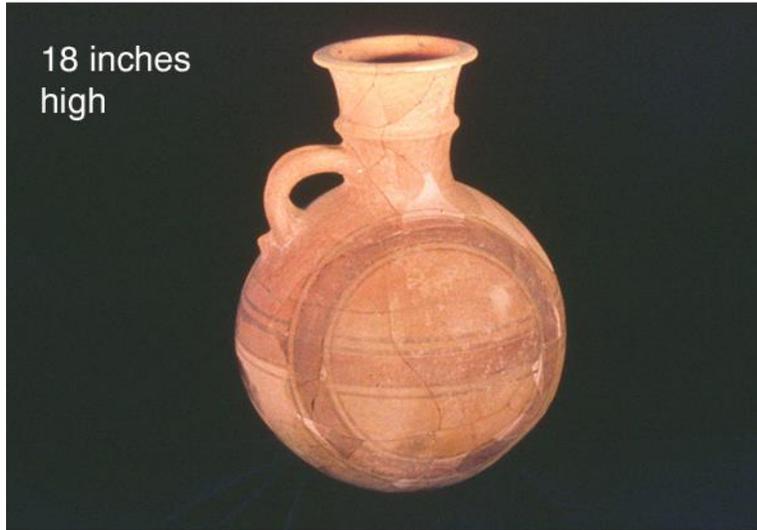
In the foreground are two lamps, thicker-walled

than those of the preceding period and more squat-shaped. The lamps of Iron II also have stump bases, not visible from this angle. The bowls shown here are typically shallow and simple in shape, with rims rising to a vertical angle, sometimes slightly ribbed on the outside. The juglets are crudely made and “baggy” in shape. The two larger water jugs in the background have a distinctive “decanter” shape. The handle attachment at the middle of the neck also is typical. Finally, one can note here that although the characteristic color of Iron II common vessels is reddish-brown, vessels occasionally showed a greenish-gray hue as do the two smaller juglets here. (Caption, BWP:BA129)

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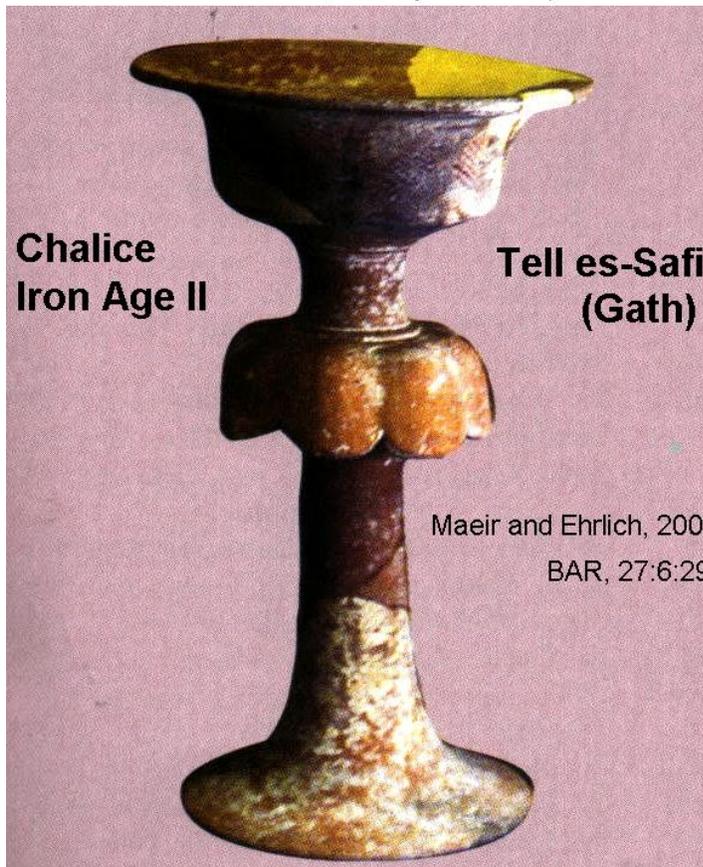
PHOTO LINK: ESN100 Pottery Vessel; Tel Masos, 11th century BC. BWP, ESN-100.

Tel Masos, Imported Phoenician Bichrome Jug  
11th century BC



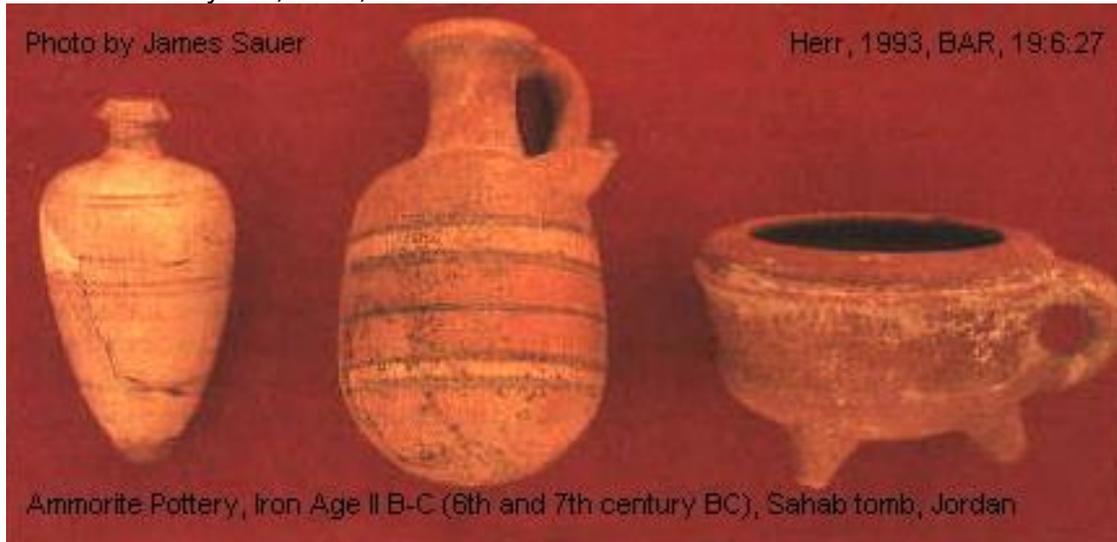
Found at Tel Masos, this imported bichrome jug dating to the 11th century B.C.E., reached Masos from the Phoenician coast. It stands about 18 inches high and was probably used for wine or olive oil (Caption,; BWP: ESN100) PHOTO LINK: GATH 008 Iron Age II (1200-1000 BC) chalice; BAR, 27:6:29.

BWP:ESN100; Photo by Aharon Kempinsk



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PHOTO LINK: POTTERY 023 Ammorite pottery from Sahab tomb, Iron Age II B-C 7th and 6th century BC, BAR, 19:6:27.



### Persian Period

PHOTO LINK: BA130 Persian period pottery, Tel Halif, BWP, BA-130.

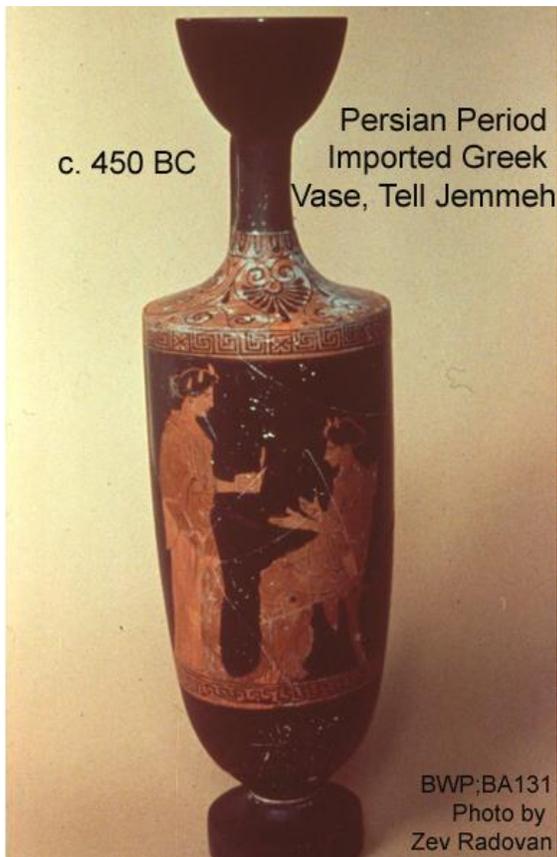


The three vessels shown here can all be dated to the late sixth or early fifth century B.C.E., during the first decades of Persian control of Palestine. Since the juglet on the left and the lamp in the center are both local vessel shapes of southern Palestine deriving from Iron II pottery types, it is interesting to compare them with examples displayed on BA129: Iron II Israelite Pottery. It is apparent that the juglet here is

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somewhat trimmer in profile than the squat Iron II juglets on BA129: Iron II Israelite Pottery. The early Persian lamp is flatter, wider and thinner-walled than its Iron II predecessors. The Iron II lamps also had stumpy bases, not visible on BA129: Iron II Israelite Pottery, which disappear before the end of the sixth century. The black-painted lamp on the right with the more closed shape is a Greek imported vessel. The imported item reflects not only the opening up of trade but also the increased Greek trading activity in the eastern Mediterranean waters. These three vessels were all found in the the same foundation trench at Tel Halif (near Beersheva), sealed beneath the wall stones of a massive multi-roomed building which had been erected on a commanding position atop the ruins of an earlier Israelite fort-city. The pottery, therefore, helped to date the construction to early in the Persian occupation period. The building may, in fact, prove to be a small fort or administrative structure connected with the Persians' establishment of control over the region (Caption, BWP:BA130).

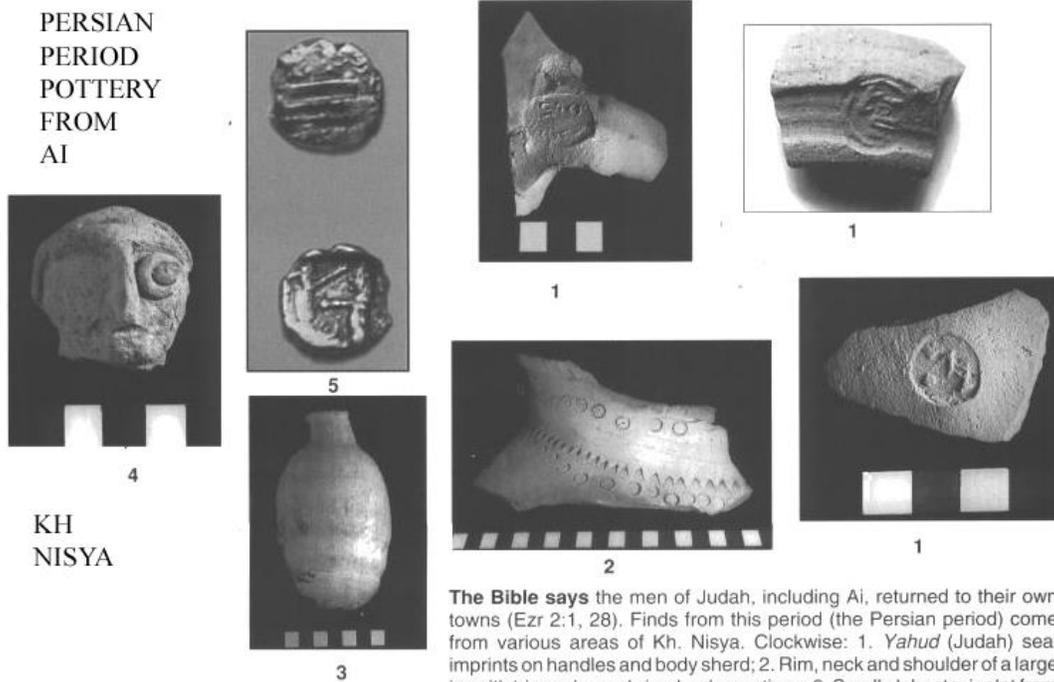
PHOTO LINK: BA131 Persian period imported Greek vase, Tell Jemmeh, BWP, BA-131.



This elegant urn was made by an accomplished Greek potter and vase painter about 450 B.C.E., when Athens was at the height of its power and aesthetic greatness. (The Parthenon was built during the same decade.) The vessel, imported to Judah, was found in the ruins of a Persian grain storage center at Tell Jemmeh (near Gaza). In 450 B.C.E. the Persians controlled the whole of the ancient Mediterranean world east of the Aegean. The Persian emperor Xerxes, however, had then recently been defeated by the Greeks in his attempt to overrun their city-states. This vase is an example of the very distinctive and highly-developed Greek culture which overwhelmed the eastern lands in the wake of Alexander's conquests in the next century (Caption, BWP:BA131)

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PHOTO LINK: AI 016 Artifacts from Persian Period from Kh Nisya = Ai, B&S, 12:1:16 (1999).



**The Bible says** the men of Judah, including Ai, returned to their own towns (Ezr 2:1, 28). Finds from this period (the Persian period) come from various areas of Kh. Nisya. Clockwise: 1. *Yahud* (Judah) seal imprints on handles and body sherd; 2. Rim, neck and shoulder of a large jar with triangular and circular decorations; 3. Small alabaster juglet from Persian context; 4. Head of a clay figurine from possible Persian level; 5. Silver Sidonian coin from the reign of Straton I (Abdashtart, 370–358 BC), twice size, with a likeness of the king of Persia slaying a lion on the obverse (bottom).

Livingston, 1999, B&S, 12:1:16

PHOTO LINK: AR025 Dor, Persian-Period Phoenician Fertility Figurine Mold; BWP, AR-025.



In the harbor town of Dor—a few miles south of modern-day Haifa, near the southern end of the Phoenician coastal strip—Ephraim Stern, directing excavations at Tel Dor beginning in 1980, discovered two *favissae*—burial pits for discarded cult objects. These pits could be dated to the fifth and fourth centuries B.C.E., a period when the cultural winds were blowing from both East and West in this port town open to both worlds. This slide and the following three (AR26: Dor, Persian Period “Maternal” Astarte Figurines; AR27: Tel Dor, Phoenician Baal-as-Zeus Head; AR28: Dor Bone Amulet of Bes) show just a few members of the diverse gallery of gods preserved for us in those *favissae*. The clay mold in the background produced 6-inch-tall goddess figures like this modern cast. The basic frontal pose of the nude goddess holding her breasts perpetuates the earlier Canaanite Iron Age tradition for portraying either Asherah or Astarte. Some influence from the classical

West may be seen in the somewhat less stiff, more rounded and naturalistic treatment of the body when compared to even the finest earlier examples of the Iron Age II (see AR24: Tel Batash, Iron Age II Female Figurine Mold).(Caption, BWP:AR025).

PHOTO LINK: BA101 Persian Period Horses and Riders (Imported); BWP, BA-101.

### Persian Period Horses and Riders



These are toy-sized models of a horse and rider. Both horse and rider are somewhat stylized and lack details and features. Horses and riders like this are common finds in the Persian period (586–332 B.C.E.). They are usually found in a *favissa* which is a repository of vessels and other objects which have been used in an associated sanctuary. The vessels and objects are collected in the *favissa* because they cannot be

returned to profane use after having been used in a cultic ritual.

This suggests that the horse and rider models were part of cultic ritual, probably a votive offering. Pagan pantheons of the period usually featured a warrior god, a fertility god, and a sun god. The rider on our horse probably represented the warrior god and the votive offering used in the ritual no doubt included a petition to the warrior god. The provenance of these particular horse and rider models is unknown (Caption, BWP:BA101).

### ***Bullae***

Similar to pottery, bullae (singular bulla) are flattened lumps of hardened clay bearing seal impressions. The bullae were used to seal official correspondence (usually on papyrus scrolls). When exposed to fire, the bullae are baked and preserved. Many bullae have been found in the Holy Land bearing the names of several biblical personages that are from the correct stratigraphic positions to be artifacts those people actually used. The listings of bullae and seals, below, are discussed more fully under the time periods when they were used.

PHOTO LINK: BULLAE HOARD 001 Jerusalem hoard from house near Stepped-Stone Structure destroyed by Neo-Babylonians 586 BC; BAR, 24:4:37.



**JERUSALEM BULLAE HOARD from room destroyed 586 BC**

Shanks, 1997, BAR, 23:4:37; Photo by Zev Radovan

**Ahaz** (2 Kings 16:2)

PHOTO LINK: BULLAE AHAZ 001 Unadorned simple seal of Ahaz; BAR, 28:4:46.



Deutch, 1991, BAR,28:4:46

**Amaryahu, servant of Hezekiah** (2 Chronicles 31:15)

PHOTO LINK: BULLAE AMARYAHU 001 Servant of Hezekiah 2 Chronicles 31:15; BAR, 28:4:48.



Deutch, 2002, bar, 28:4:48 Amaryahu servant of Hezekiah

**Asayah, servant of Hezekiah** (2 Kings 22:12; 2 Chron 34:20)

PHOTO LINK: BULLAE ASAYAHU 001 Seal of "Asayahu servant of the king" [Josiah], 622 BC, 2 Kings 22:12; 2 Chron 34:20; BAR, 22:2:38.

SEAL OF ASUYAHU, Shanks, 1996, BAR, 22:2:38



A GALLOPING HORSE and the Hebrew inscription "Belonging to 'Asayahu, servant of the king" decorate this reddish limestone seal, measuring about a half-inch long and dating to the seventh century B.C.E.

Asaiah, the shortened form of the name 'Asayahu, appears frequently in the Bible, and is twice paired with the title "servant of the king," designating a high public official (2 Kings 22:12; 2 Chronicles 34:20). Perhaps the owner of this seal was the Asaiah, servant of the king, sent by King Josiah in 622 B.C.E. to the Temple to examine the Scroll of the Law—now identified by scholars as the Book of Deuteronomy—discovered by the high priest Hilkiah.

Ironically, Josiah banned horses as a symbol during his religious reforms: "He removed the horses that the kings of Judah had dedicated to the sun at the entrance to the House of the Lord" (2 Kings 23:11).

**Azaryahu (Asariah), servant of Hezekiah** (1 Chron 6:13 and 9:11)

PHOTO LINK: BULLAE AZARYAHU 001 (Az, not Am) Azariah 1 Chron 6vs13 and 9vs11; BAR 17:4:33.



Schneider, 1991, BAR, 17:4:33; Photo by Israel Antiquities Authority; Sketch by Ada Yardeni

**Baalyasha (biblical Ba'alis)** (Jer. 40:14-41:2)

PHOTO LINK: BULLAE BAALYASHA 001 [Milkom'ur, servant of Baalyasha]; BAR, 19:6:32.



Seal impression (bullae) "Belonging to Milkom'ur, servant of Baalyasha" (Baalis of Jeremiah 40:41). Herr, 1993, BAR, 19:6:32

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PHOTO LINK: BULLAE BAALYASHA 001B Clay cone stopper "Belonging to Milqom, servant of Ba'alis"; BAR, 25:2:48.



Deutsch  
1999

BAR  
25:2:48

"Belonging to Milqom, servant of Ba'alis"

PHOTO LINK: BULLAE BAALYASHA 002 Wax seal and drawing "Belonging to Ba'alis" "king" "son of Ammon"; BAR, 25:2:46-47.



SEALED BY A KING. Produced by a seal that has recently come to light (see cover photo), the modern-day impression at left mimics, albeit in damaged form, those that were once affixed to important documents in the royal Ammonite court. The top line (drawing below), partially reconstructed, reads, "[Belonging to] Ba'alis." The sword "king" flanks the winged sphinx at center, while the nearly indecipherable bottom line contains the partial first and last letters of the phrase "Sons of Ammon."  
The Bible describes the Ammonites as constant enemies from Israel's earliest days in Canaan: "And the Ammonites crossed the Jordan to fight also against Judah and against Benjamin and against the house of Ephraim; so that Israel was sorely distressed" (Judges 10:9). Ba'alis, the early sixth-century B.C.E. king to whom the seal belonged, continued this tradition of animosity when he dispatched an assassin to murder Gedaliah, the Babylonian-appointed governor of Judah. The assassination is commemorated even today in Jewish tradition by a yearly fast.

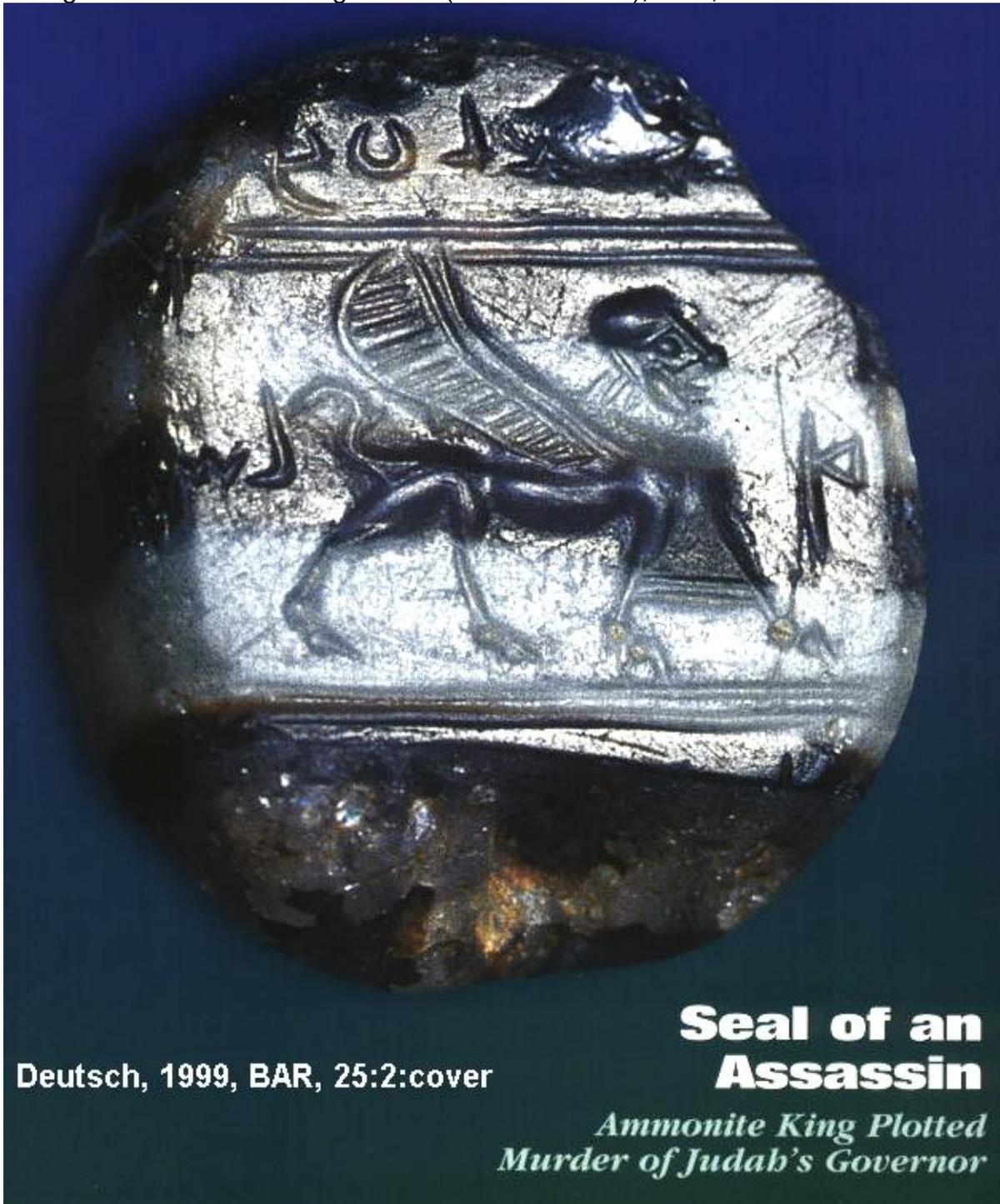
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PHOTO LINK: BULLAE BAALYASHA 003 Chart of Ammonite kings 10th century BC to 580 BC; BAR, 25:2:48.

<b>Name</b>	<b>Date</b>
Nahash	10th century B.C.E.
Hanun	10th century B.C.E.
Ba'sha	c. 853 B.C.E.
Shanip	c. 735 B.C.E.
Pado'el	before 701 B.C.E.
Barak-el	c. 675 B.C.E.
Amminadab I	c. 650 B.C.E.
Hissal'el	c. 625 B.C.E.
Amminadab II	c. 600 B.C.E.
Ba'alis	c. 580 B.C.E.

Deutsch, 1999, BAR, 25:2:48

PHOTO LINK: BULLAE BAALYASHA 004 Agate seal of king Ammonite Ba'alis who arranged murder of Judah's governor (Jer. 40:14-41:2); BAR, 25:2:front cover.



Deutsch, 1999, BAR, 25:2:cover

**Seal of an  
Assassin**

*Ammonite King Plotted  
Murder of Judah's Governor*

**Barak, Amorite King**

PHOTO LINK: BULLAE BARAK 001 Bullae with fingerprints "Belonging to Barak-el the king" Ammonite royal seal; BAR, 25:2:49.



"Belonging to Barak-el, the king"

**Baruch, Scibe of Jeremiah (Jer. 36:4)**

PHOTO LINK: BULLAE BARUCH 001 Bullae of Jeremiah's scribe of Jer. 36:4; BAR, 17:4:26.



Schneider, 1991, BAR, 17:4:26; Photo by David Harris

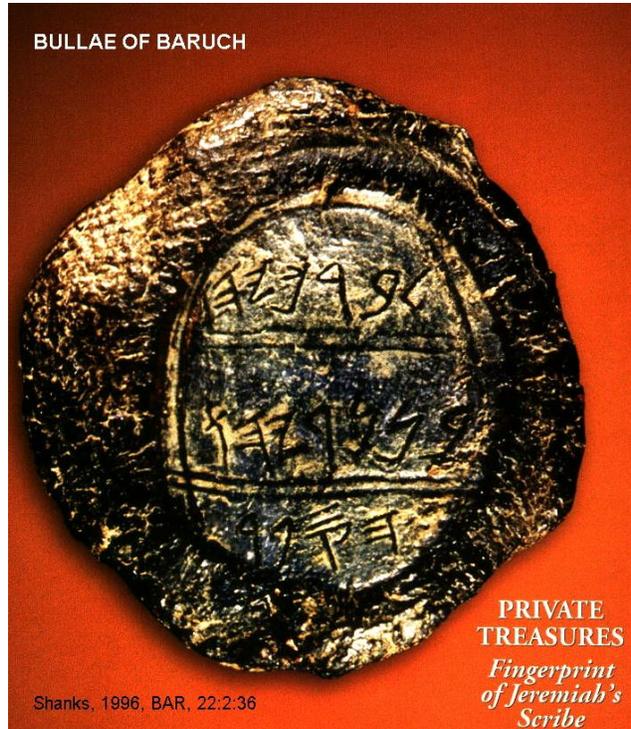
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PHOTO LINK: BULLAE BARUCH 002 Bullae of Jeremiah's scribe with fingerprints; BR, 15:5:37.



PHOTO LINK: BULLAE BARUCH 003 Fingerprints of Baruch on bullae; BAR, 222:36.

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PHOTO LINK: BULLAE BARUCH 003B Fingerprints of Baruch on bullae; BAR, 22:2:36.  
BULLAE OF BARUCH with fingerprint.



Shanks, 1996, BAR, 22:2:36

PHOTO LINK: BULLAE BARUCH 004 Drawing of second bullae inscription; BAR, 22:2:37.



Drawing of the Bullae of Baruch, early 6th to late 7th century BC. Shanks, 1996, BAR, 22:2:37  
"Belonging to Berekhyahu, son of Neriyahu the scribe"

PHOTO LINK: BULLAE BARUCH 004B Drawing and photo of second bullae inscription; BAR, 22:2:37.

627-572 BC

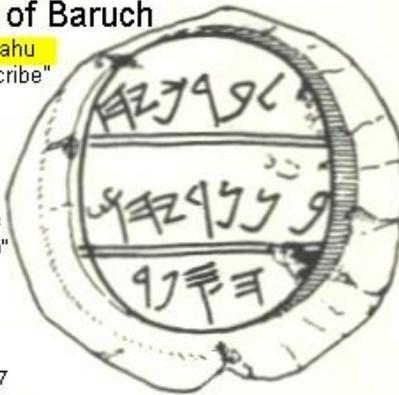


### Second Bullae of Baruch

"Belonging to Berekhyahu  
son of Neriyahu, the scribe"

Jeremiah 36:3-4

"Jeremiah called Baruch  
son of Neriah, and Baruch  
wrote down...all the words  
which the Lord had spoken"



Shanks, 1996, BAR, 22:2:37

**Domla, servant of Hezekiah**

PHOTO LINK: BULLAE DOMLA 001 Servant of Hezekiah; BAR, 28:4:28.



PHOTO LINK: BULLAE DOMLA 002 Servant of Hezekiah; BAR, 28:4:28.



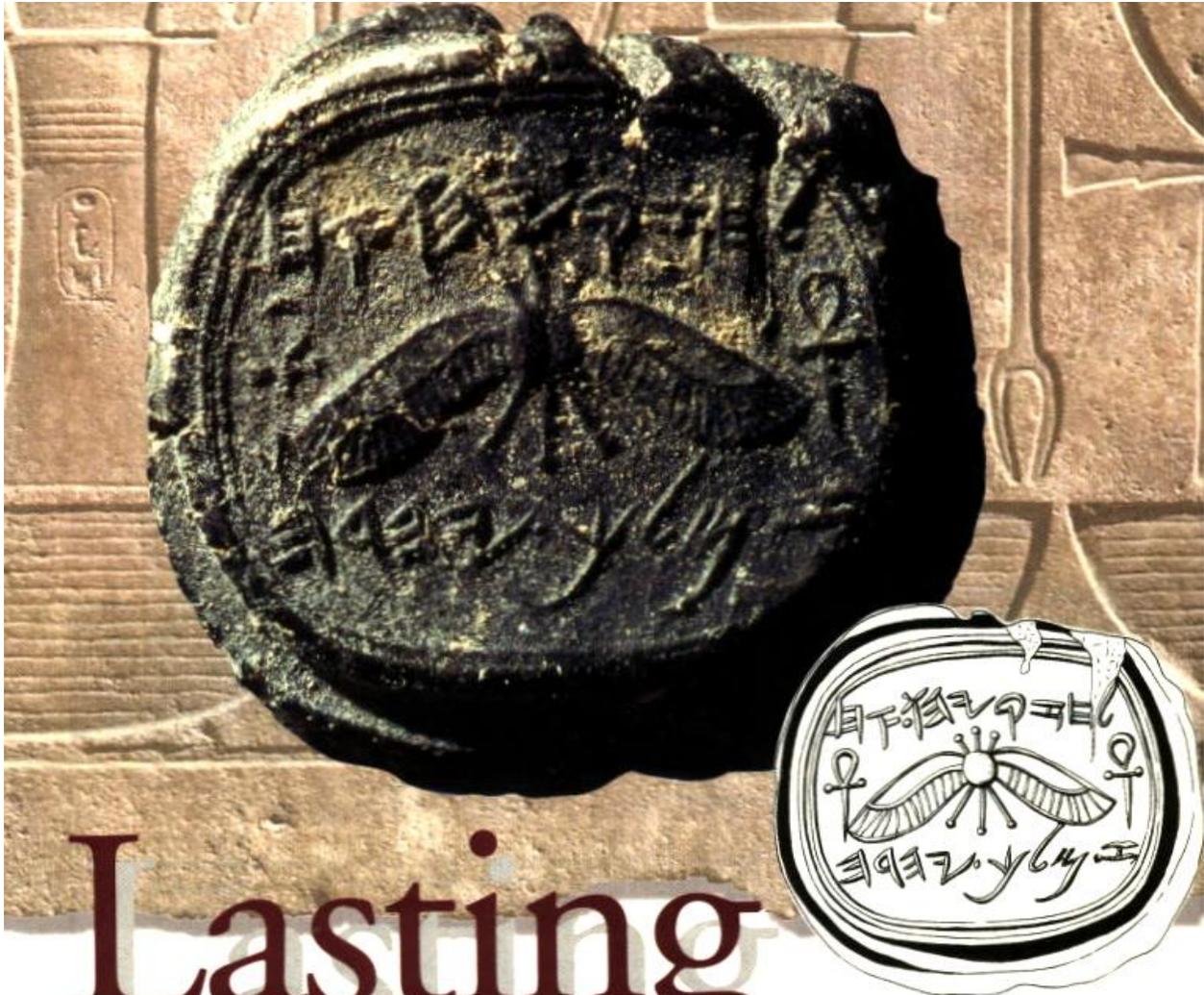
**Gemaryahu, (Gemariah), Temple official** (Jer. 36:10)

PHOTO LINK: BULLAE GEMARYAHU 001 Jeremiah 36:10; BAR, 17:4:29.



**Hezekiah** (2 Kings 18-20)

PHOTO LINK: BULLAE HEZEKIAH 001 Hezekiah seal with Egyptian emblems; BAR, 28:4:42.



# Lasting Impressions

Deutsch, 2002, BAR, 28:4:42

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PHOTO LINK: BULLAE HEZEKIAH 002 Two seals of Hezekiah; BAR, 28:4:44. Photograph by Robert Deutsch.



PHOTO LINK: BULLAE HEZEKIAH 003 These have Egyptian iconography on them; BAR, 28:4:45. Photograph by Robert Deutsch.



PHOTO LINK: EGYPT 007 Egyptian influences in Israelite Art, BAR, 28:4:47.

**Egyptian Influence in Ancient Israel**

Although the artifacts shown here were all unearthed at archaeological sites in modern Israel, the West Bank and Gaza, they look like they may have come from Egypt. Through most of the Bronze Age (3000-1200 B.C.E.) Egypt's robust cultural and economic hegemony extended across the Sinai peninsula and up the Mediterranean coast as far as the southern reaches of Anatolia (modern Turkey). Well into the Iron Age (1200-586 B.C.E.), during the reign of the Judahite king Hezekiah (727-697 B.C.E.), Egypt still exerted strong influence in the region. Author Robert Deutsch suggests that by then, however, some symbols of Egyptian origin had been accepted as transcultural emblems of royalty that could be appropriated by any sovereign, such as Hezekiah, who might want to project an image of dominance and power.

Assorted anthropoid clay coffins (left) dating to the Late Bronze Age (c. 1550-1200 B.C.E.), were found at Deir el-Balah in the Gaza Strip. Their lids have characteristically Egyptian poses. An ivory plaque (center) depicts the Egyptian god Hch crouching between two ankhs and holding a palm branch in either hand. It is dated to the Late Iron Age (1000-586 B.C.E.) and was found in Samaria, the capital of the northern kingdom of Israel. An ivory head of the Egyptian goddess Hathor (below, left) that dates to the Late Bronze Age (1550-1200 B.C.E.) was unearthed at Megiddo. A statuette of a pregnant woman wearing an Egyptian wig (below, center), which was discovered in the Phoenician cemetery at Ahziv, dates to the seventh or sixth century B.C.E. A Late Bronze Age faience amulet (below, right) found in Israel depicts the Egyptian dwarf god Bes, protector of women and childbirth.

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Deutsch, 2002, BAR, 28:4:47

**Nathan-Melech, servant of Josiah** (2 Kings 23:11)

PHOTO LINK: BULLAE NATHAN-MELECH 001 Nathan-Melech, servant of the king [Josiah] ;BAR, 28:2:47.



SHLOMO MOUSSAIEFF

**"Belonging to Nathan-melech  
servant of the king [Josiah]"**



P. KYLE MCCARTER, JR.

McCarter, Jr, 2002, BAR, 28:2:47

PHOTO LINK: BULLAE NATHAN-MELECH 003 Nathan-Melech, who is servant over the house of the king [Josiah]; BAR, 28:2:47.



ISRAEL MUSEUM

**"...Nathan who is over  
the house [of Josiah]"**

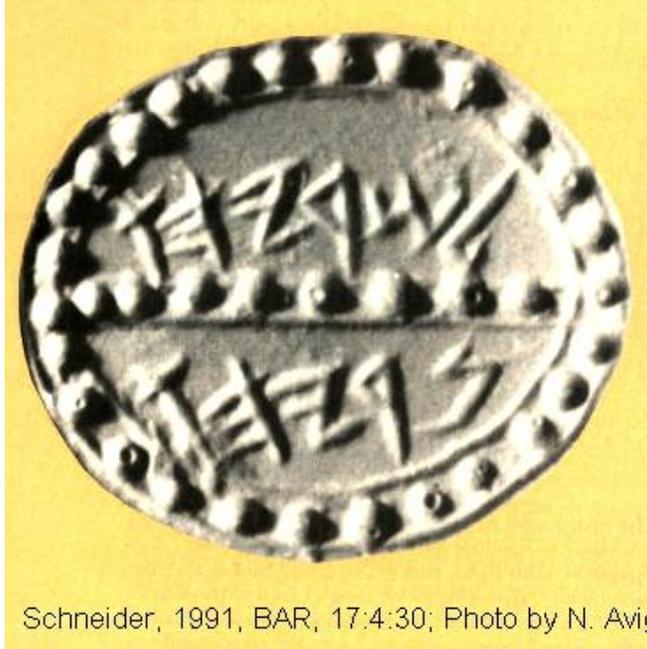


NAHMAN AVIGAD

McCarther, Jr., 2002, BAR, 28:2:47

**Seriah, brother of Baruch** (Jer. 32:12, 51:59)

PHOTO LINK: BULLAE SERIAH 001 Brother of Baruch Jer 32:12, 51:59; BAR, 17:4:30.



Schneider, 1991, BAR, 17:4:30; Photo by N. Avig

**Shema', servant of Jeroboam II**

PHOTO LINK: BULLAE SHEMA' 001 Seal of Shema servant of Jeroboam II, B&S, 13:4:119.



Gene Fackler, after Pritchard 1954, No. 276.

**Impression of the seal of Shema',** an official during the reign of Jeroboam II. The inscription on the seal reads "(Belonging) to Shema', servant of Jeroboam." Found at Megiddo in 1904, this is the earliest of a number of seals and seal impressions that bear the names of Biblical personages. Wood, 2000, B&S, 13:4:119

PHOTO LINK: JEROBOAM II 001 Seal of Shema servant of Jeroboam II; BAR, 21:6:50.



"SEAL OF SHEMA, SERVANT OF JEROBOAM [II]", 784-748 BC

Lemaire, 1996, BAR, 21:6:50

### Tobshalem, Commander of the Army [of Hezekiah?]

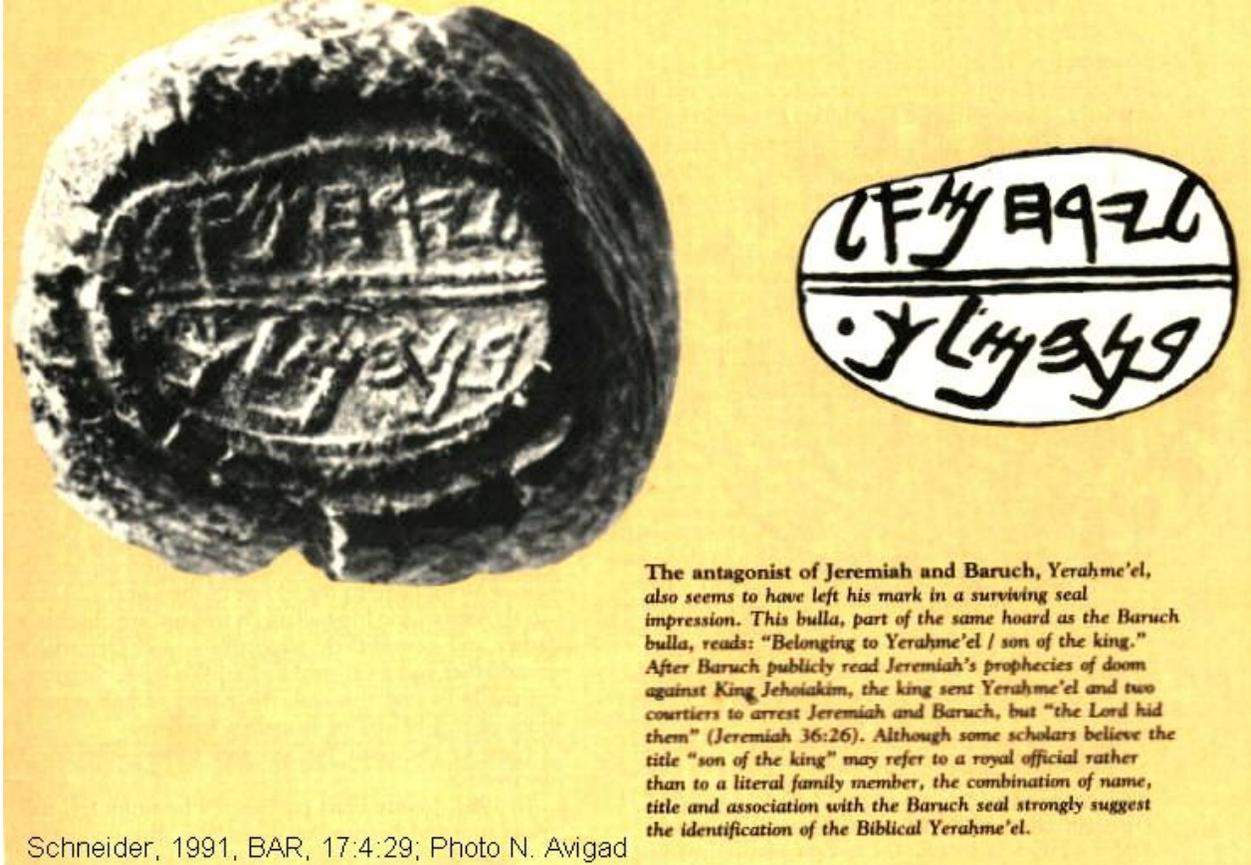
PHOTO LINK: BULLAE TOBSHALEM 001 Commander of the Army; BAR, 28:4:28.



Deutsch, 2002, BAR, 28:4:28 Tobshalem Army commander

**Yerahme'el, Antagonist of Jeremiah (Jer. 36:26)**

PHOTO LINK: BULLEA YERAHME'EL 001 Antagonist of Jeremiah in Jer. 36:26; BAR, 17:4:29.



Schneider, 1991, BAR, 17:4:29; Photo N. Avigad

## Elephantine Bullae and Papyrus

Some bullae with their original papyrus are found at Elephantine.

PHOTO LINK: BULLAE ELEPHANTINE 001 Elephantine papyrus with bullae; BAR, 28:4:46.



BROOKLYN MUSEUM

Deutsch, 2002, BAR, 28:4:46

## Seals

Sometimes the seals themselves (or rings) used to make the bullae are found.

PHOTO LINK: BA 117 Iron Age Hebrew on Officials' Seals; BWP, BA-117.



## Abiah, servant of Uzziah (2 Kings 14:21)

PHOTO LINK: SEAL OF ABIAH 001 Seal of Abiah, Servant of Uzziah (2 Kings 14:21); B&S, 14:4:20.



**Seal of Abiah, servant of Uzziah.** It is 1.61 cm x 1.20 cm x 0.38 cm (0.63 in x 0.47 in x 0.15 in) in size. The seal depicts the Egyptian infant sun god Nefertoum kneeling on three lotus flowers. On either side of the figure is the inscription "(belonging) to Abiah servant (of) Uzziah." B&S, 13:4:120

**Abni, servant of Hoshea**

PHOTO LINK: HOSHEA KING 002 Seal "Belonging to Abni Servant of Hoshea" 732-722.BC in Old Hebrew; BAR, 27:2:47



**"BELONGING TO ABDI, SERVANT OF HOSHEA"**

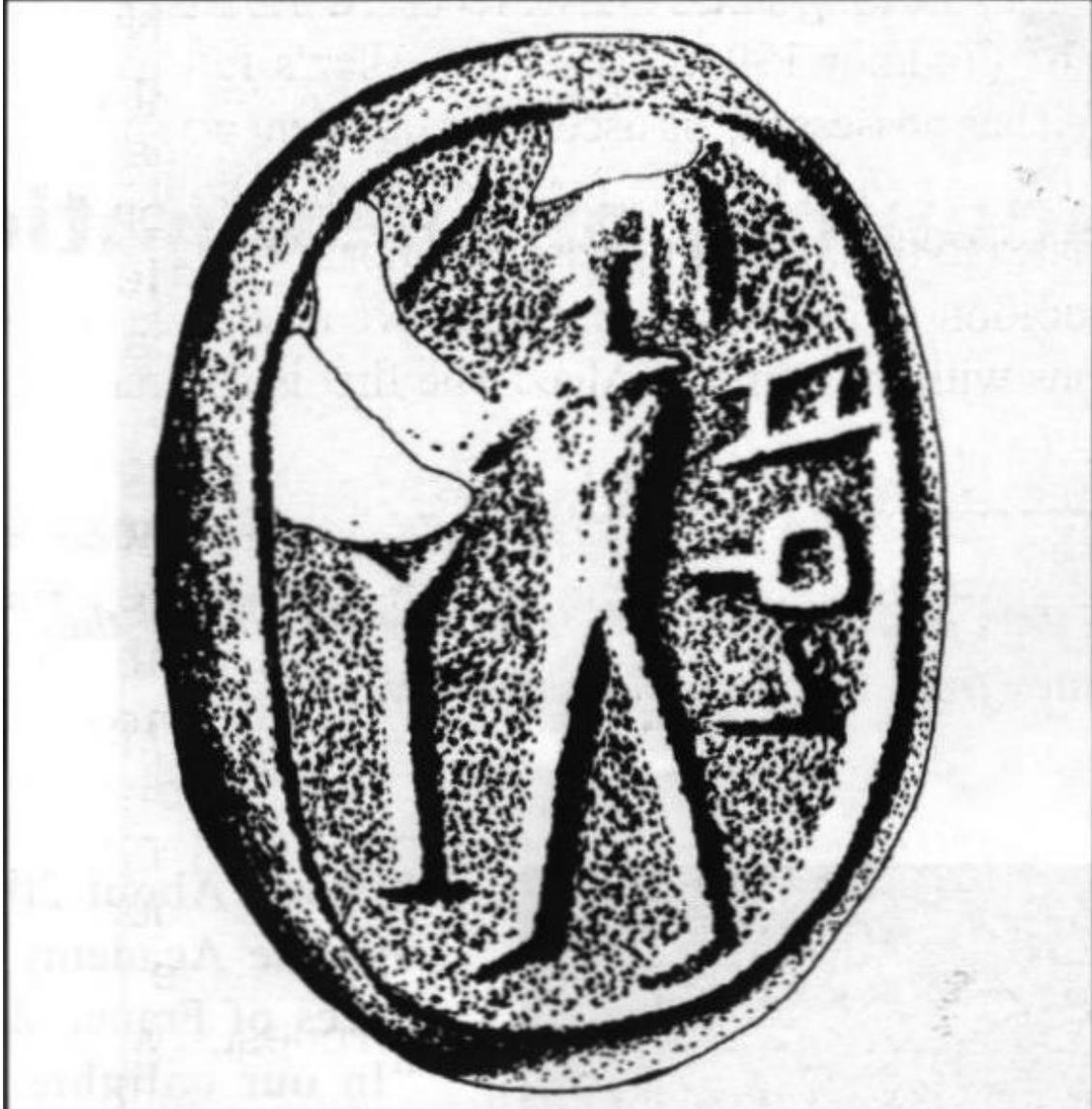
732-722 BC; McCarter, 1997, BAR, 27:2:47

PHOTO LINK: HOSHEA KING 004 Seal of Abdi Servant of Hoshea; BAR, 26:6:front cover.



**Pekah** (2 Kings 15:24)

PHOTO LINK: SEAL OF PEQAH 001 Seal of Peqah (Pekah) (2 Kings 15:24); B&S, 14:1:25.



**Seal of Peqah, son of Remaliah King of Israel**

Wood, 2001, B&S, 14:1:25; Photo by Gene Fackler

## Shema, servant of Jeroboam II

The Seal of Shema (also spelled Shama'), servant of Jeroboam was found at Megiddo in 1904. It was made of jasper and measured 3.7cm x 2.7cm.

PHOTO LINK: SEAL OF SHAMA' 001 Seal of Shama', servant of Jeroboam II; BAR, 20:1:29.



Finkelstine and Ussishkin, 1994, BAR, 20:1:29

PHOTO LINK: BULLAE SHEMA' 001 Seal of Shema servant of Jeroboam II; B&S, 14:4:119



Gene Fackler, after Pritchard 1954, No. 276.

**Impression of the seal of Shema'**, an official during the reign of Jeroboam II. The inscription on the seal reads "(Belonging) to Shema', servant of Jeroboam." Found at Megiddo in 1904, this is the earliest of a number of seals and seal impressions that bear the names of Biblical personages. Wood, 2000, B&S, 13:4:119

**Yaazenyahu (Jaazaniah), servant of Gedaliah (2 Kings 25:23)**

PHOTO LINK: SEAL OF YAAZENYAHU 001 Seal of officer Jaazaniah the Maacathite (2 Kings 25:23); BAR, 21:6:50.



**SEAL OF YAAZENYAHU SERVANT OF THE KING**

7th century BC, Tell en-Nasbeh (identity of king is unknown)

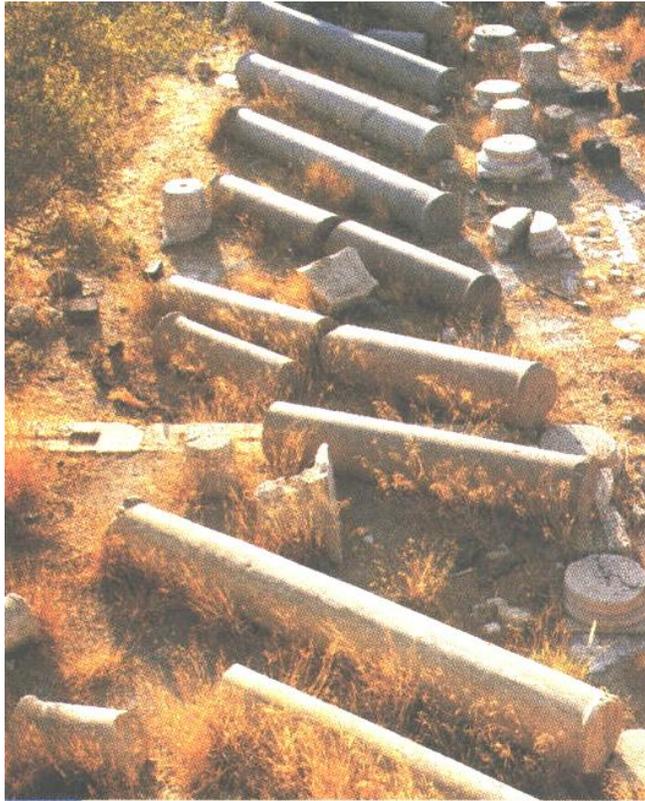
***Natural and Man-Caused Destruction Levels***

At individual sites, stratum are identified by their place in relative time. Stratums are often separated by destruction layers. It is often assumed that these destruction layers represent conquests of a city by an invading army. But natural destructions by earthquakes are also possible. Natural destructions by earthquakes can be distinguished from man-caused destructions in the following ways (Nur and Ron, 1997:52-53):

**Neat rows of fallen columns**

When seismic waves move through a tell, the physical response to the wave by materials of similar size, shape and mass are identical. Columns will fall in the direction of surface wave propagation (Nur and Ron, 1997:52-53) .

PHOTO LINK: EARTHQUAKE 003 Fallen columns in a row from Sussita (in Greek, Hippos) 749 AD; BAR, 23:4:5.



**NEAT ROWS OF FALLEN COLUMNS**

Sussita, 749 AD; Nur and Row, BAR, 1997, 23:4:5

Photo Garo Nalbandian

**Collapsed walls**

Unlike during warfare, where wall or gate complex breeches are localized, entire sections of wall collapse during earthquakes. Examples of this are at Mesada and at Beth-Shean in the Jordan Valley (Nur and Ron, 1997:52-53).

PHOTO LINK: EARTHQUAKE 004 Collapsed walls at Masada; Nur and Ron, 1997, 23:4:52.



**COLLAPSED WALLS, MASADA**

Nur and Ron, 1997, BAR, 23:4:52

Photo by Israel Exploration Society

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PHOTO LINK: EARTHQUAKE 005 Collapsed walls at Beth-Shean, Jordan Valley, Byzantine arch collapse 749 BC; BAR, 23:4:52.

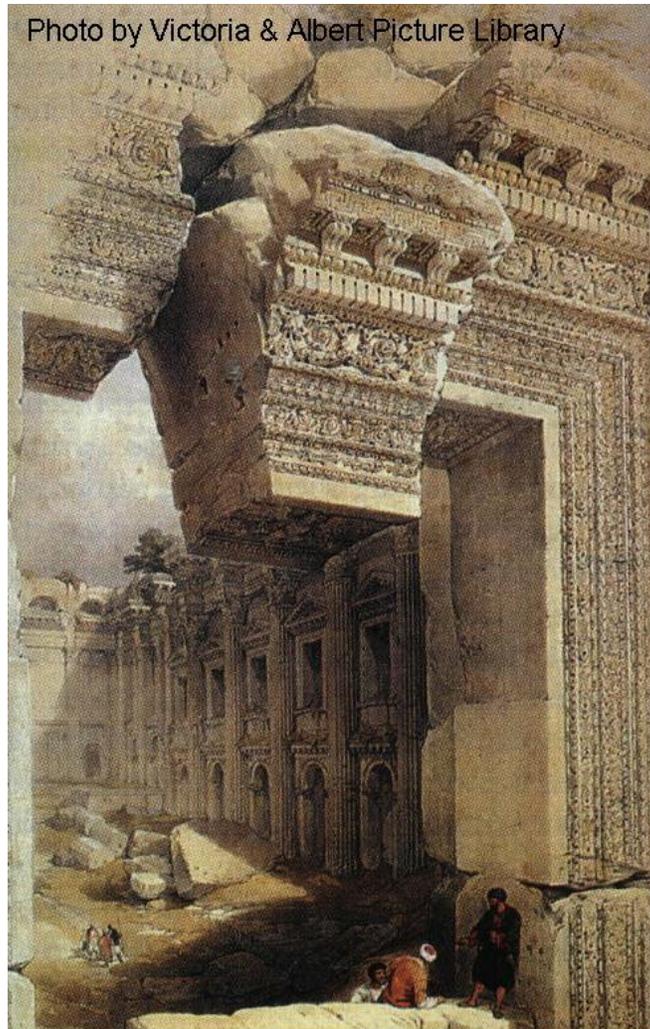


**Collapsed Walls, Beth Shean, 749 BC  
Nur and Ron, 1997, BAR, 23:4:52, Photo H. Shanks**

## Slipped Keystones

Arches made of stone or brick obtain strength because of the compression that the keystone block experiences from weight of overlying materials. Stress is distributed along the arch to the two vertical sides. In earthquakes, the arch structure is temporarily placed in a stress regime of tension. In this condition, the keystone block drops under force of gravity. If the block falls completely, the arch and associated structure collapses. This condition was illustrated by lithographer David Roberts in the 19<sup>th</sup> century AD when he drew the down-dropped massive keystone at Baalek, in northeastern Lebanon. That arch had been constructed by Roman Emperor Antonius Pius in the second century BC. It has since disappeared. (Nur and Ron, 1997:52-53).

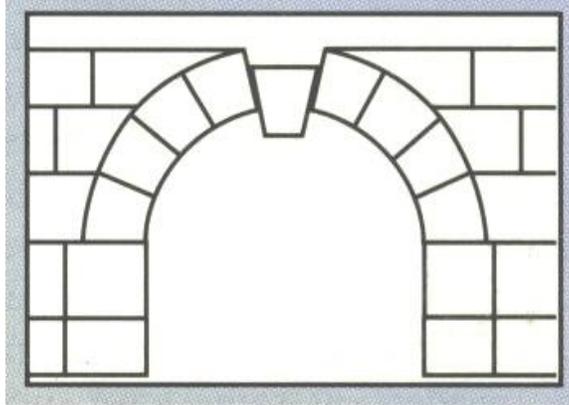
PHOTO LINK: EARTHQUAKE 006 Slipped keystone at Baalek, 2<sup>nd</sup> century BC; BAR, 23:4:52.



**SLIPPED KEYSTONE AT BAALBEK**

Nur and Ron, 1997, BAR, 23:4:52

PHOTO LINK: EARTHQUAKE 007 Diagram of slipped keystone; BAR, 23:4:52.



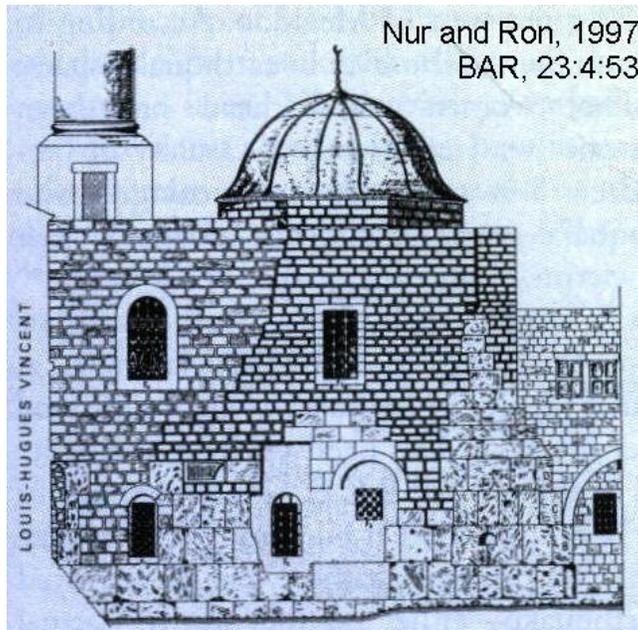
**SLIPPED KEYSTONE**

Nur and Ron, 1997, BAR, 23:4:52

***Patched walls***

In populated areas, repairs were made to structures damaged by earthquakes. An example of this is the patched walls of the Judean-Christian synagogue on Mount Zion. This synagogue was built in the 1<sup>st</sup> century BC and repeatedly repaired after damaged caused (at least in part) by intermittent earthquakes; Nur and Ron, 1997:52-53)

PHOTO LINK: EARTHQUAKE 008 Patched walls at Beth Shean synagogue 1<sup>st</sup> century BC; BAR, 23:4:54.



**PATCHED WALLS, Mount Zion**

1<sup>st</sup> century BC synagogue

Repeated earthquake damage repairs

## Crushed Skeletons

When skeletons are crushed under falling debris or under walls, it is an indication that the human remains are the result of death and internment caused by earthquakes. An example was a female who died in an earthquake at Dor about 1020 BC. The excavators named her "Doreen" (Nur and Ron, 1997:52-53).

PHOTO LINK: EARTHQUAKE 009  
Crushed skeleton of "Doreen" at Dor,  
c. 1020 BC (RIGHT), BAR, 23:4:53.

## Pattern of Destruction

When entire regions are destroyed with evidence for rows of fallen columns, collapsed walls, slipped keystones, patched walls and crushed skeletons, this is evidence that an earthquake not military activity was the cause of the destruction. An example of this situation is the Levant-wide destruction of c. 1020 BC. Evidence for earthquake activity is known from Tel Akhziv (in Galilee) in the north to Tel Mazos (west of the Dead Sea) in the south (Nur and Ron, 1997:52-53).



**CRUSHED SKELETON, DOR, C. 1020 BC**  
Nur and Ron, 1997, BAR, 23:4:53

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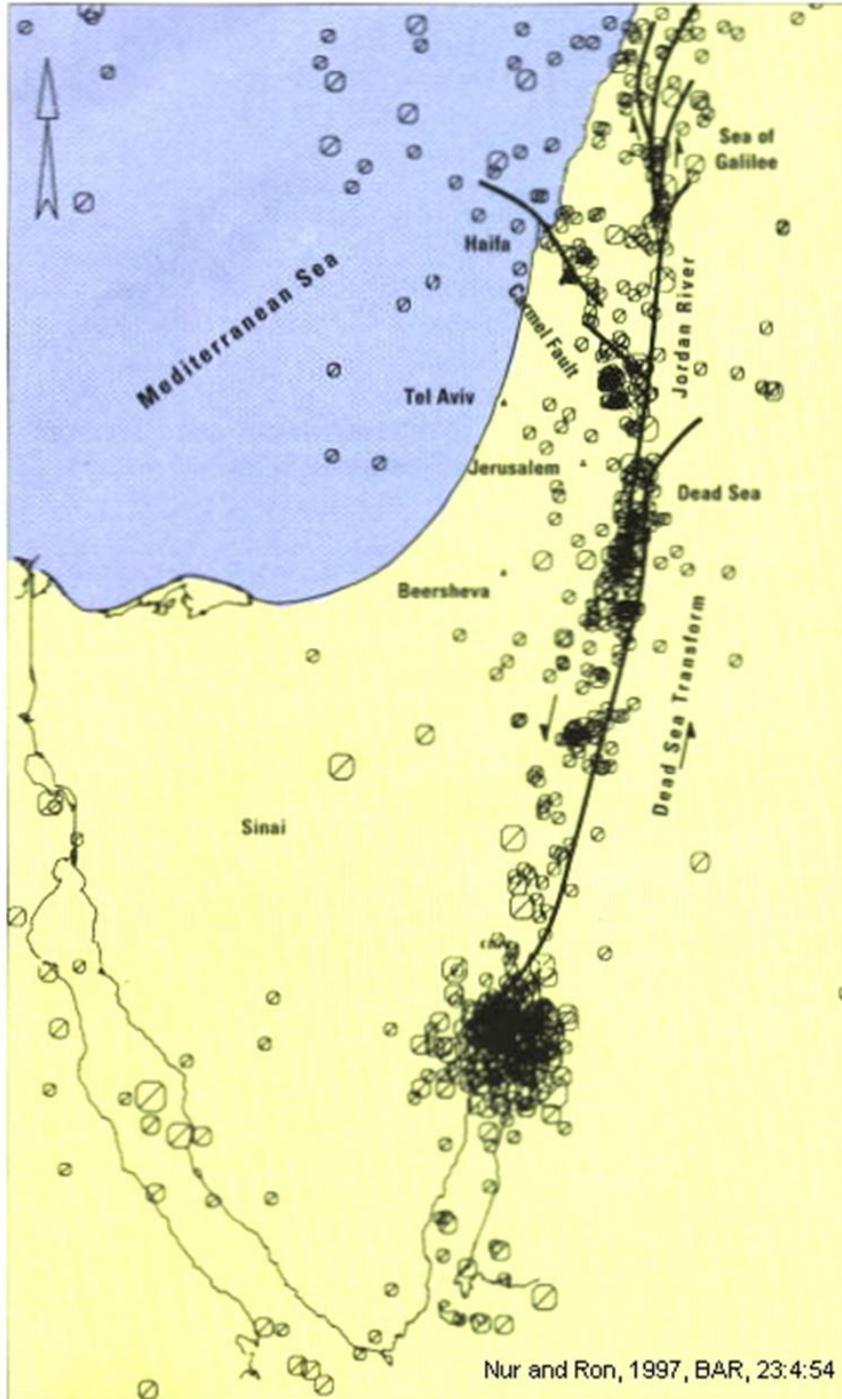
PHOTO LINK: EARTHQUAKE 010 Patterns of regional destruction from c. 1020 BC earthquake in Israel; BAR, 23:4:53.



It must be cautioned, however, that earthquakes may weaken military defenses in a region that expedite military conquest soon after the earthquake. The region of Palestine continues to have seismic activity.

PHOTO LINK: EARTHQUAKE 011 Earthquake epicenters in Israel and Sinai 1981-1987; BAR, 23:4:54.

**Earthquakes in and around Israel  
from 1981 to 1987** (Ministry of Energy and Infrastructure)

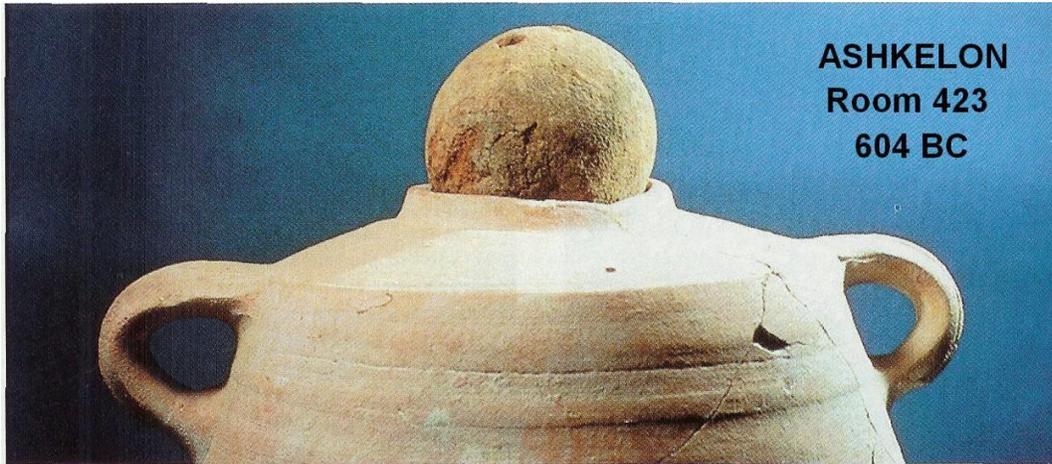


## **Botanical methods**

The science of botany as applied to archaeology gives important clues to deciphering the past. Seeds, weeds and other food stuffs can survive when other parts of a settlement (or archaeological site) are destroyed. Inferences can be made from archaeo-botanical information as to the time of year that a destruction occurred, or the regions from which a city may have had trade. An example of the application of botany to archaeological investigations is the study by Weiss and Kislev (2004) at Ashkelon.

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PHOTO LINK: WINE 001 Wine fermenting jar and clay stoppers with burnt wheat; Weiss and Kislev, 2004, BAR, 30:6:36. Photos by Andrews, Carl / Leon Levy Expedition to Ashkelon.



DOZENS OF CLAY BALLS (above)—some as large as grapefruits—found in a winery in Ashkelon, posed a dilemma for the excavators. What were they? Because the balls were perforated through their centers, it was thought that they might have been loom weights, used to anchor threads while weaving. More likely, however, they are wine-jar stoppers. The clay balls fit easily into the mouths of fat-bellied storage jars (top photo). Plugging the jars during fermentation, the stoppers allowed the build-up of gases to be released at regular intervals through their perforations.

At right are examples of “wheat piles” found by archaeologists that contain the remains of various species of wheat grains and weeds burned and preserved under Ashkelon’s destruction debris. The authors were able to identify the specific species of wheat and weeds and locate their probable origins.



## Geophysical methods

### *Ground Penetrating Radar*

An indirect “excavation” technique called ground penetrating radar is used to find buried structures or cavities without removal of materials. Radar waves penetrate the ground and reflect or refract off of surfaces between materials having different densities or other physical properties.

PHOTO LINK: GROUND PENETRATING RADAR 001 Diagram of GPD theory; BAR, 18:4:49.

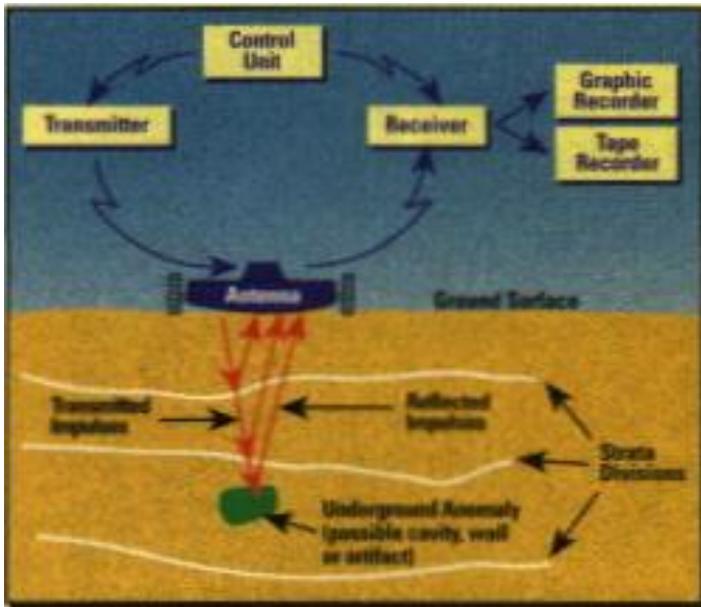
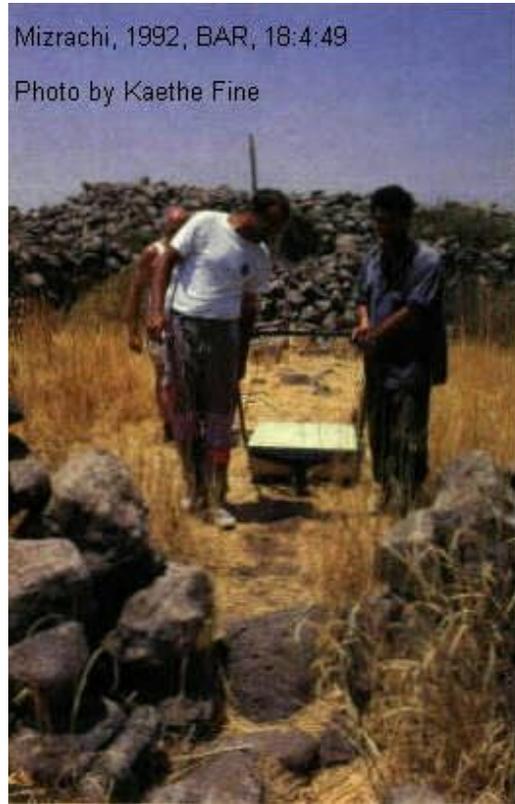


PHOTO LINK: GROUND PENETRATING RADAR 002 Field acquisition, BAR, 18:4:49.

Mizrachi, 1992, BAR, 18:4:49

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An example of the application of this technique is in the search for burial structures at Rogem Hiri in the Golan Heights. This is one of several mystery circles dating from the Early Bronze Age II-III (3050-2300 BC) and also from Iron Age II (1000-586 BC). Rogem Hiri is a large site and too big to be totally excavated, but the GPR was able to narrow the search for buried man-made structures there (Mizrachi, 1992).

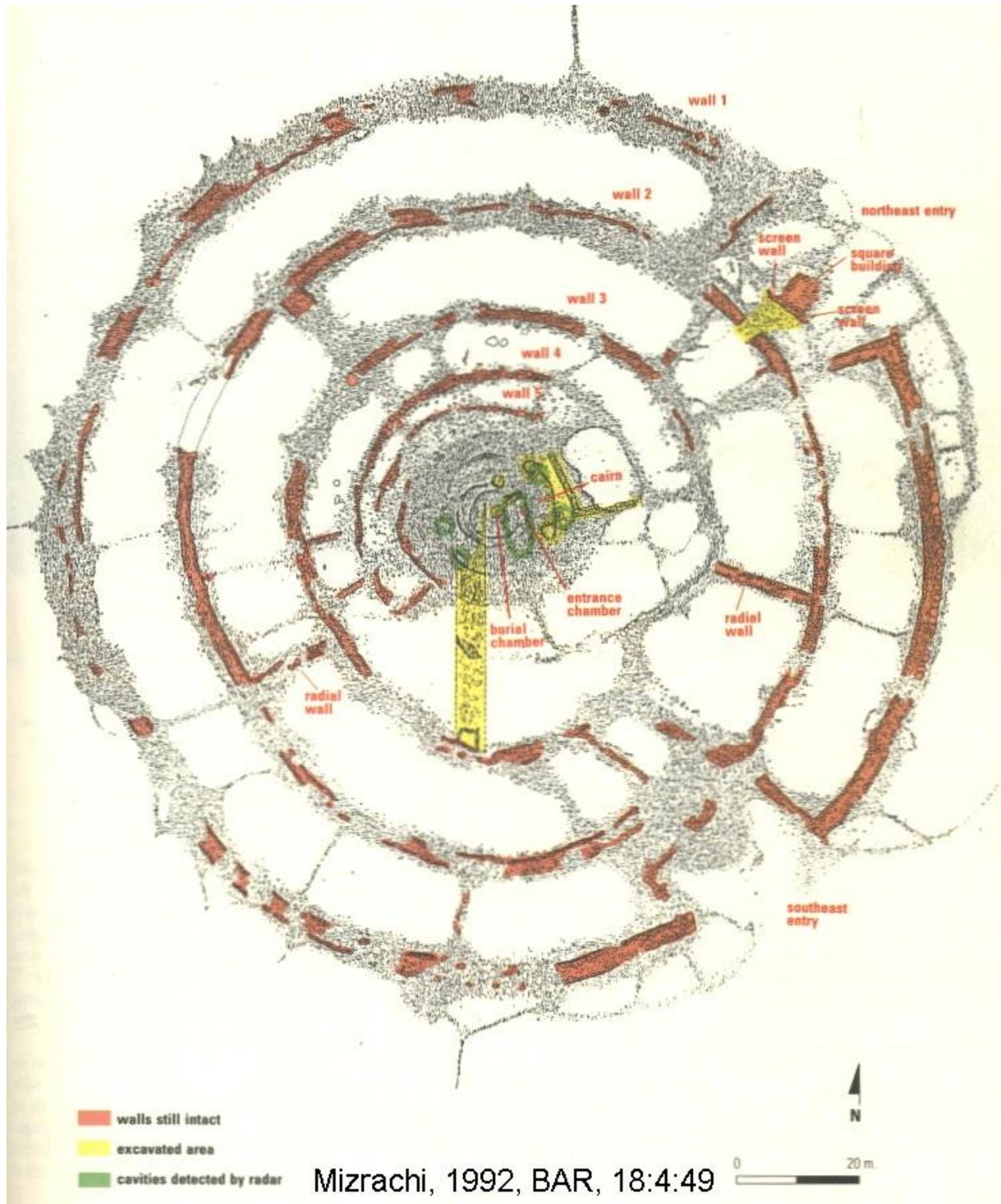
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PHOTO LINK: GROUND PENETRATING RADAR 004 Aerial photo of Rogem Hiri circle;  
BAR, 18:4: front cover



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PHOTO LINK: GROUND PENETRATING RADAR 005 Plan with radar cavities Rogem Hari; BAR, 18:4:49.



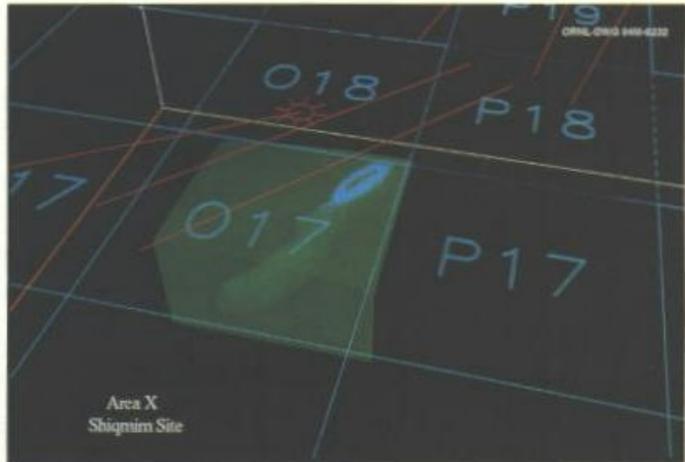
***Geophysical Diffraction Tomology (GDT)***

This is a seismic exploration technique applied to archaeology. As sound moves through rock, it does so at different speeds in different mediums. When it encounters material of different density (bulidings, vaults, etc), the seismic energy is reflected or refracted, or diffracted. Seismic studies allow for the determinations of structures and open spaces (tombs) before any excavation takes place (Levy, 1995).

PHOTO LINK: ARCHAEOLOGICAL METHODS 001 GDT Survey at Chalcolithic Shiqmim, Negev; BAR, 21:4:49.

A HONEYCOMB OF TUNNELS and underground rooms (left) runs beneath an area of Shiqmim, one of the largest Chalcolithic sites in the Negev. Before the discovery of this complex, archaeologists had believed that such structures existed only at Beer-Sheva, 12 miles to the east. To learn whether Shiqmim had such features elsewhere under its 24 acres, excavators in 1993 turned to a new technology known as geophysical diffraction tomography (GDT). In the photo below, students from the University of California at San Diego place GDT microphones on a hillside about 1,000 feet east of the honeycomb area shown at left.

GDT uses sound waves to detect underground anomalies and translates them into images on a computer screen. At right, the GDT "probe" begins to reveal an underground structure (pale green) below square O17 in Shiqmim's Area X; the red lines indicate the line of GDT microphones, while the red starburst indicates a hydrophone bore-hole.



Levy, 1995, BAR, 21:4:49



**GEOPHYSICAL DIFFRACTION TOMOGRAPHY (GDT) SURVEY**

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### *Computer Graphics Programs*

Auto Cad documentation of field data allows the archaeologist to display information at any orientation or scale (Levy, 1995).

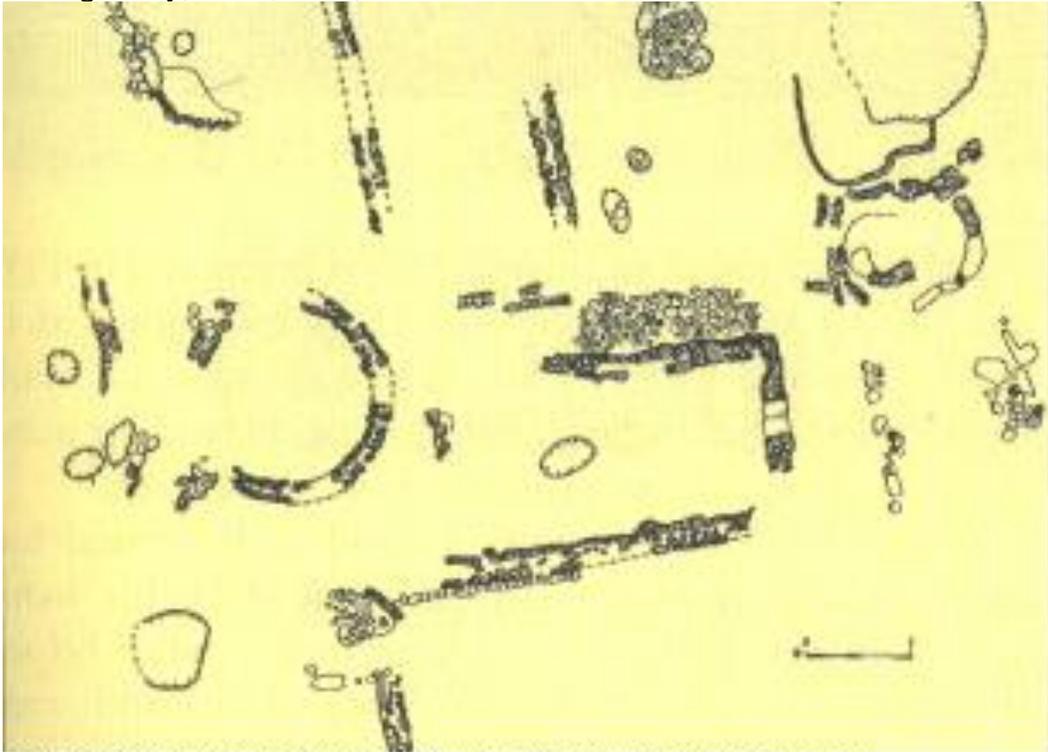
PHOTO LINK: ARCHAEOLOGICAL METHODS 002A Auto Cad example: excavation aerial photo Gilat, northern Negev, 4th millennium BC; Levy, 1995, BAR, 21:4:47. Photography by Thomas E. Levy.



Excavations at Gilat, northern Negev, late 5th-to-4th century BC

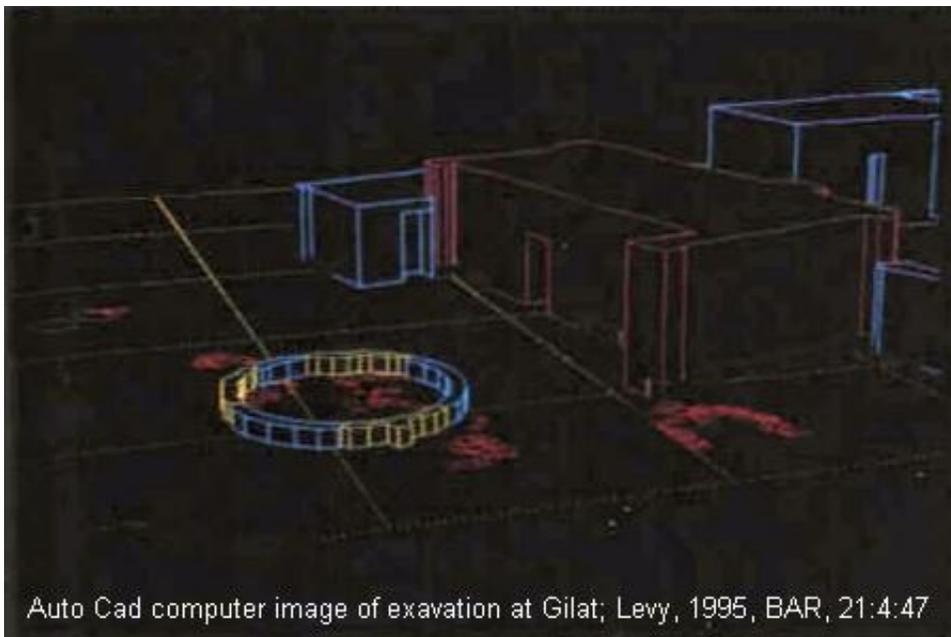
## CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY

PHOTO LINK: ARCHAEOLOGICAL METHODS 002B Auto Cad example: Traditional hand drawing. Levy, 1995, BAR, 21:4:47.



Traditional hand drawings of excavation: Gilat

PHOTO LINK: ARCHAEOLOGICAL METHODS 002C Auto Cad example: 3-dimensional Auto Cad illustration. Levy, 1995, BAR, 21:4:47.



Auto Cad computer image of excavation at Gilat; Levy, 1995, BAR, 21:4:47

## RELATIVE DATING AND COMPARATIVE STRATIGRAPHY

As cities rise and fall, cycles of building, occupation and destruction are marked by the successive burial of older cities by newer ones in one area. This creates a mound of layered man-made materials and artifacts with the older ones on the bottom and the younger ones on top. These artificial mounds can be several tens or even hundreds of feet thick and are called “tells” (in Arabic, “tels”). This geometric arrangement is called stratigraphy. By comparing stratigraphies at different tells, a pattern of occurrence of pottery (and other artifacts) in relative time is observed. These patterns lead to generalizations about the relative age of the pottery and the cultural strata that contain them. The general sequence, as compiled from available data is identified as:

Youngest

- Iron Age
- Bronze Age
- Copper Age (Chalcolithic)
- Stone Age (Paleolithic)

Oldest

These names were applied to stratigraphic zones based on the materials that were used to make some of the artifacts and reflected increasing technological sophistication.

These general periods can be further subdivided, depending on the level of archaeological information available about a particular area. In biblical studies, the EB (early Bronze), MB (middle Bronze), LB (late Bronze) and IA (Iron Age) are very important. These can be further subdivided into smaller time periods such as MBI, MBII, MBIII, etc.

The commonly accepted dates for Bronze Age subdivisions in Palestine are described in Ray (1997:61, cited by Hansen, 2003):

<b>Date (BC)</b>	<b>Archaeological Period Name</b>
3250-2900 BC	Early Bronze Age I (EB I)
2900-2650	Early Bronze Age II (EB II)
2650-2250	Early Bronze Age III (EB III)
2300-1950	Early Bronze Age IV or Middle Bronze Age I (EB IV, MB I)

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<b>Date (BC)</b>	<b>Archaeological Period Name</b>
1950-1720	Middle Bronze Age IIA (MB IIA)
1720-1600	Middle Bronze Age IIB (MB IIB)
1600-1480	Middle Bronze Age IIC (MB IIC)
1480-1440	Late Bronze Age IA (LB IA)
1440-1390	Late Bronze Age IB (LB IA)
1390-1295	Late Bronze Age IIA (LB IIA)
1295-1175	Late Bronze Age IIB (LB IIB)
1175-587	Iron Age (IA)

### **ABSOLUTE DATING**

For archaeology, literary and a variety of geochemical/geophysical methods are used to deduce the age of artifacts. Compilation of data from these different methods leads to the development of timelines for the biblical narratives. Timelines used in this course are listed below:

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## Timelines

Timelines of John C. Whitcomb (1964)

PHOTO LINK: [TIMELINE JCW 2090-1830 BC; Whitcomb, 1969. ABR/WOT.](#)

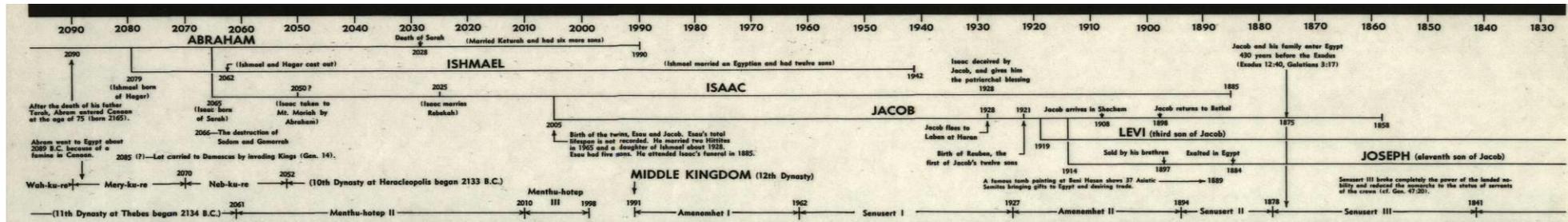
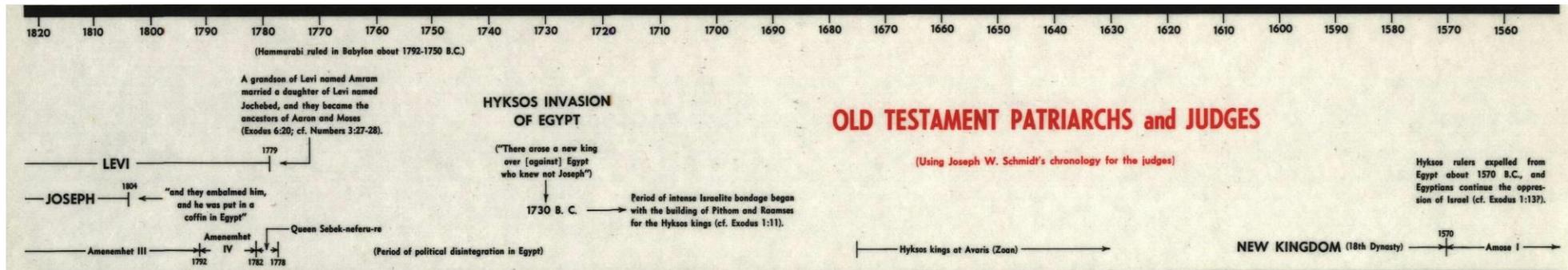


PHOTO LINK: [TIMELINE JCW 1820-1560 BC; Whitcomb, 1969. ABR/WOT.](#)



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PHOTO LINK: TIMELINE JCW 1540-1280 BC; Whitcomb, 1969. ABR/WOT.

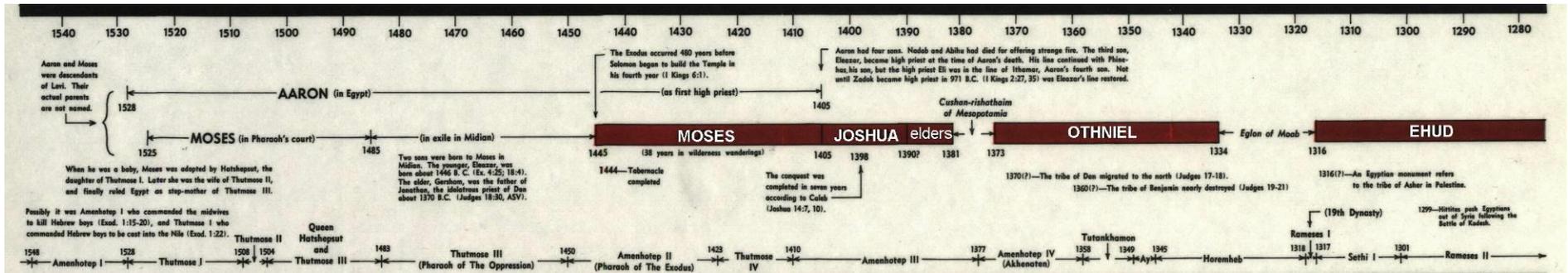
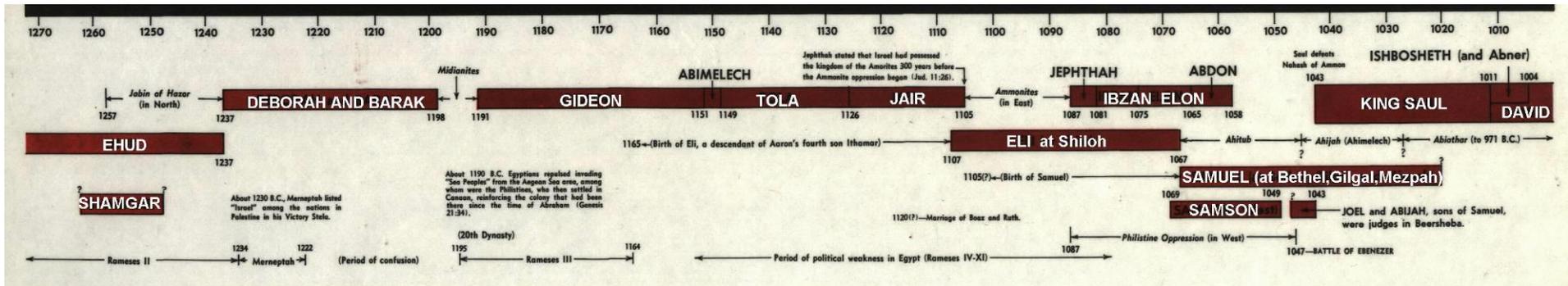


PHOTO LINK: TIMELINE JCW 1270-1004 BC; Whitcomb, 1969. ABR/WOT.



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PHOTO LINK: TIMELINE JCW 1050-0840 BC; Whitcomb, 1969. ABR/WOT.

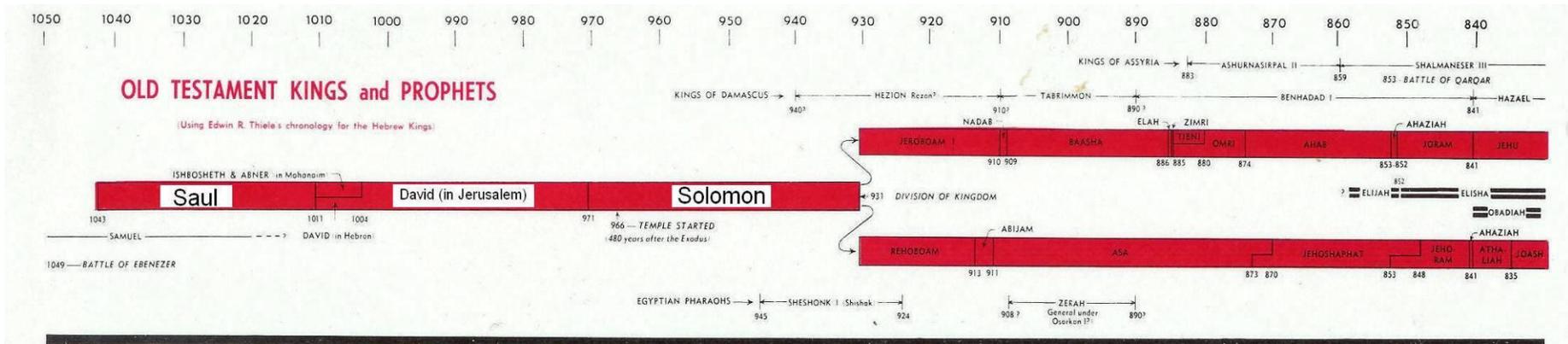
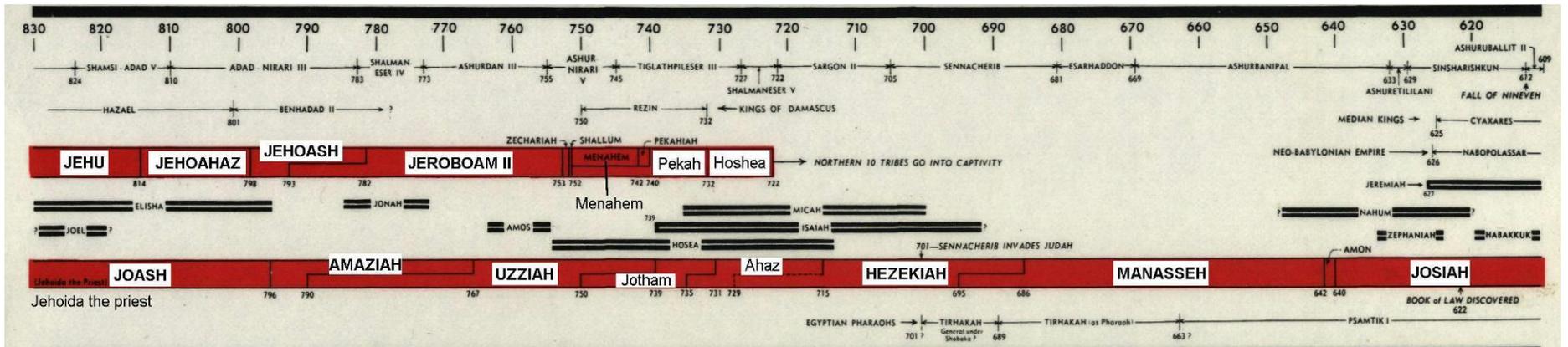
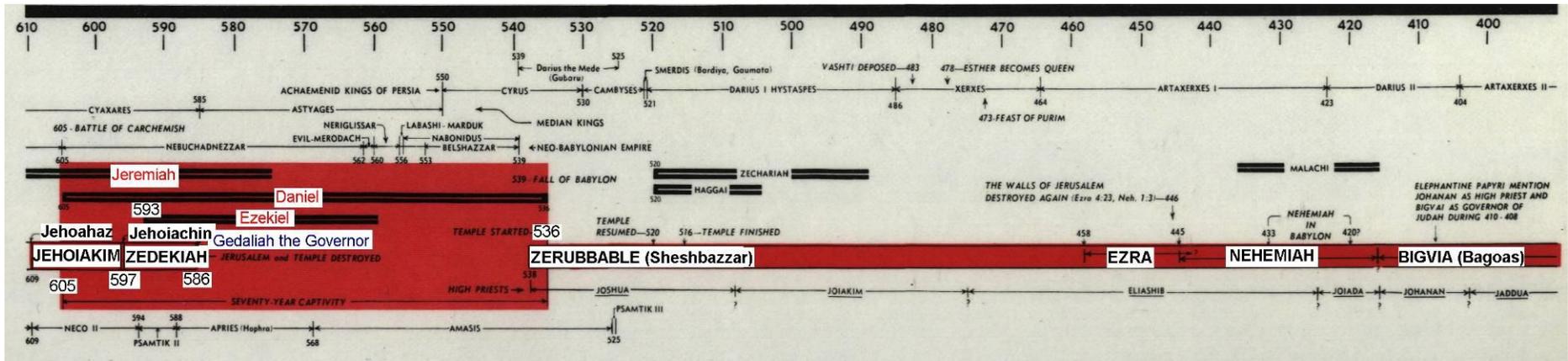


PHOTO LINK: TIMELINE JCW 0830-0610 BC; Whitcomb, 1969. ABR/WOT.



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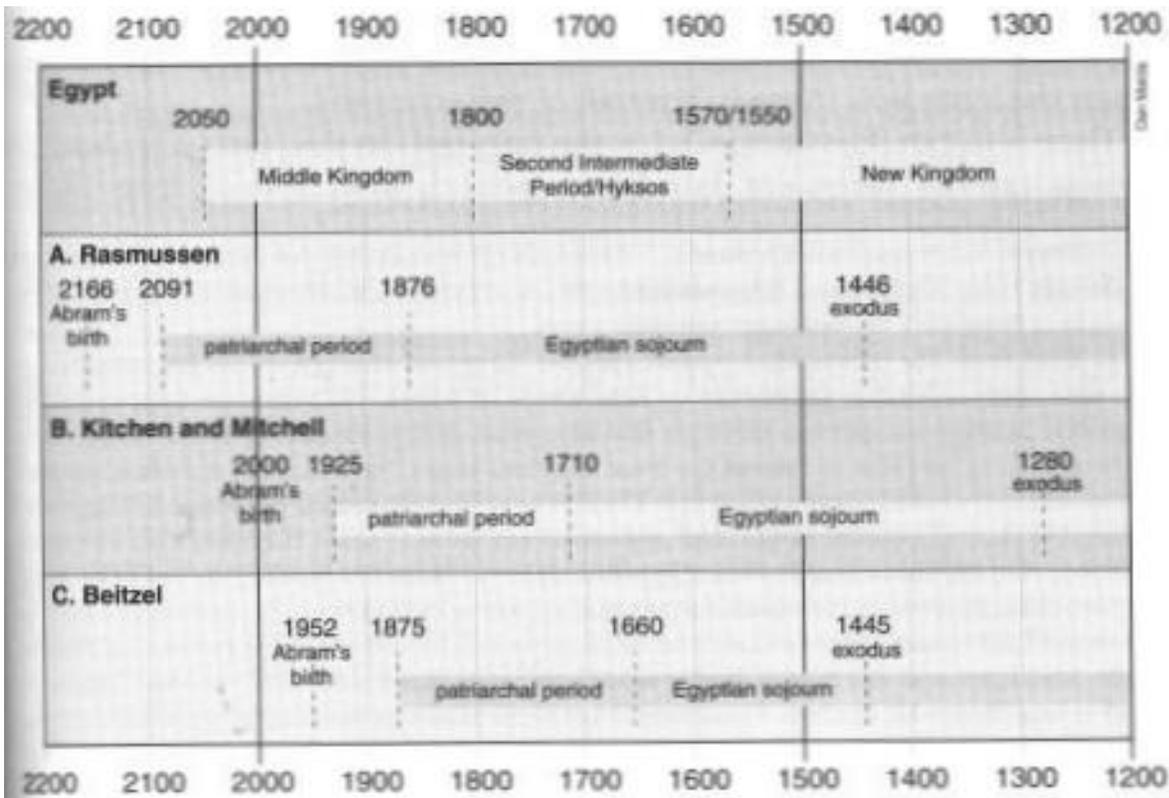
PHOTO LINK: TIMELINE JCW 0610-0390 BC; Whitcomb, 1969. ABR/WOT.



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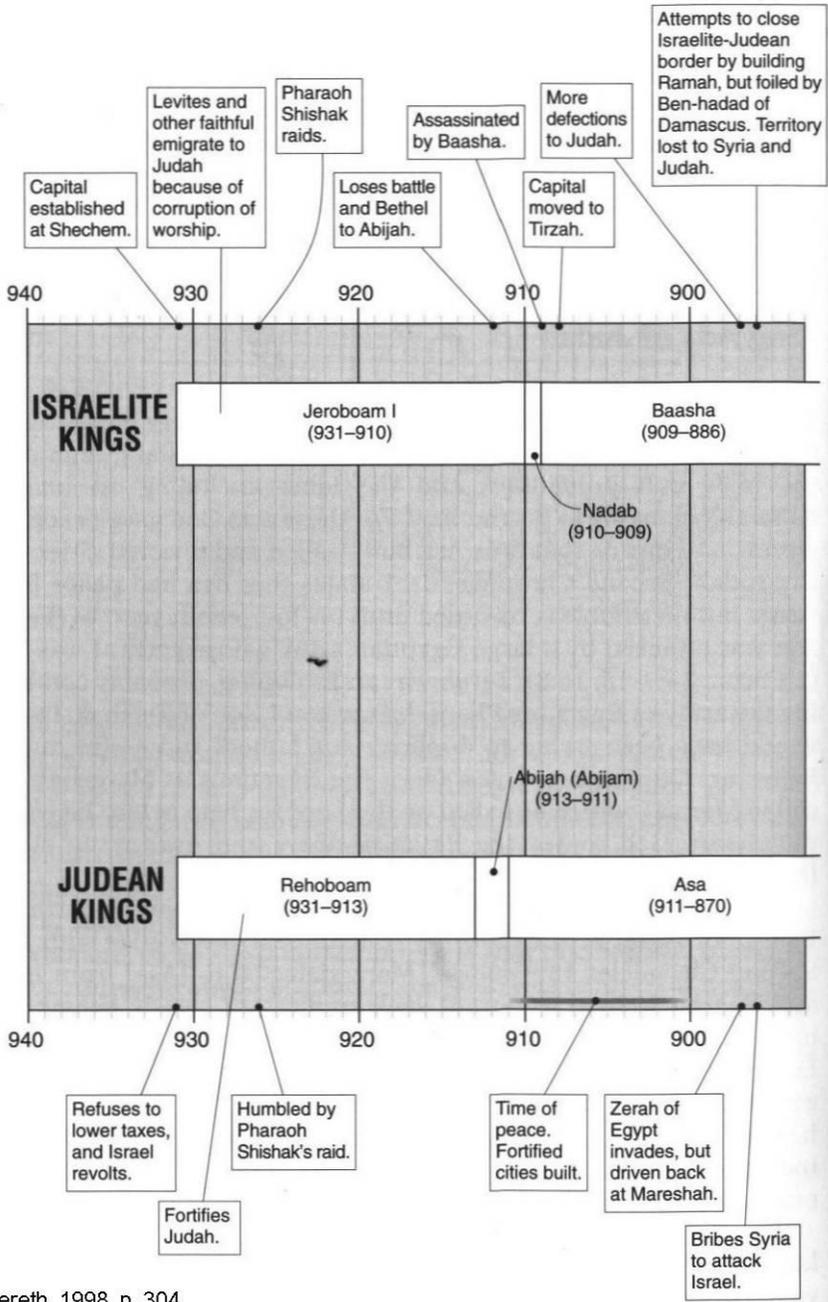
Timelines of Hoerth (1998)

PHOTO LINK: TIMELINE HOERTH PATRIARCHAL AGE: 2200 to 1200 BC; Hoerth, 1998,:57.



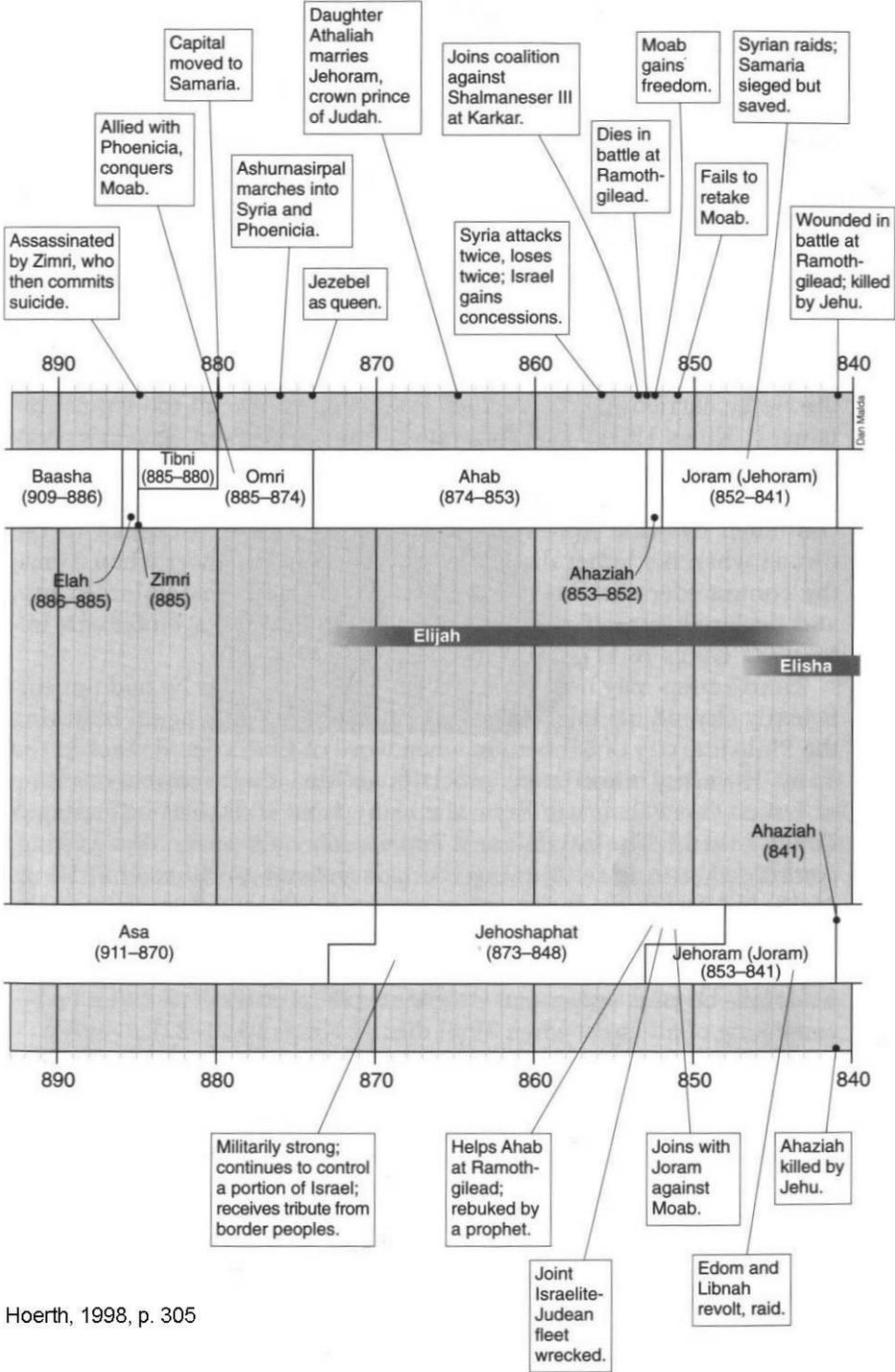
Timelines for the Patriarchal period, Egyptian sojourn and Exodus. Hoerth, 1998:57

CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY  
 PHOTO LINK: TIMELINE HOERTH 940-894 BC Israel + Judah; Hoerth, 1998:304.



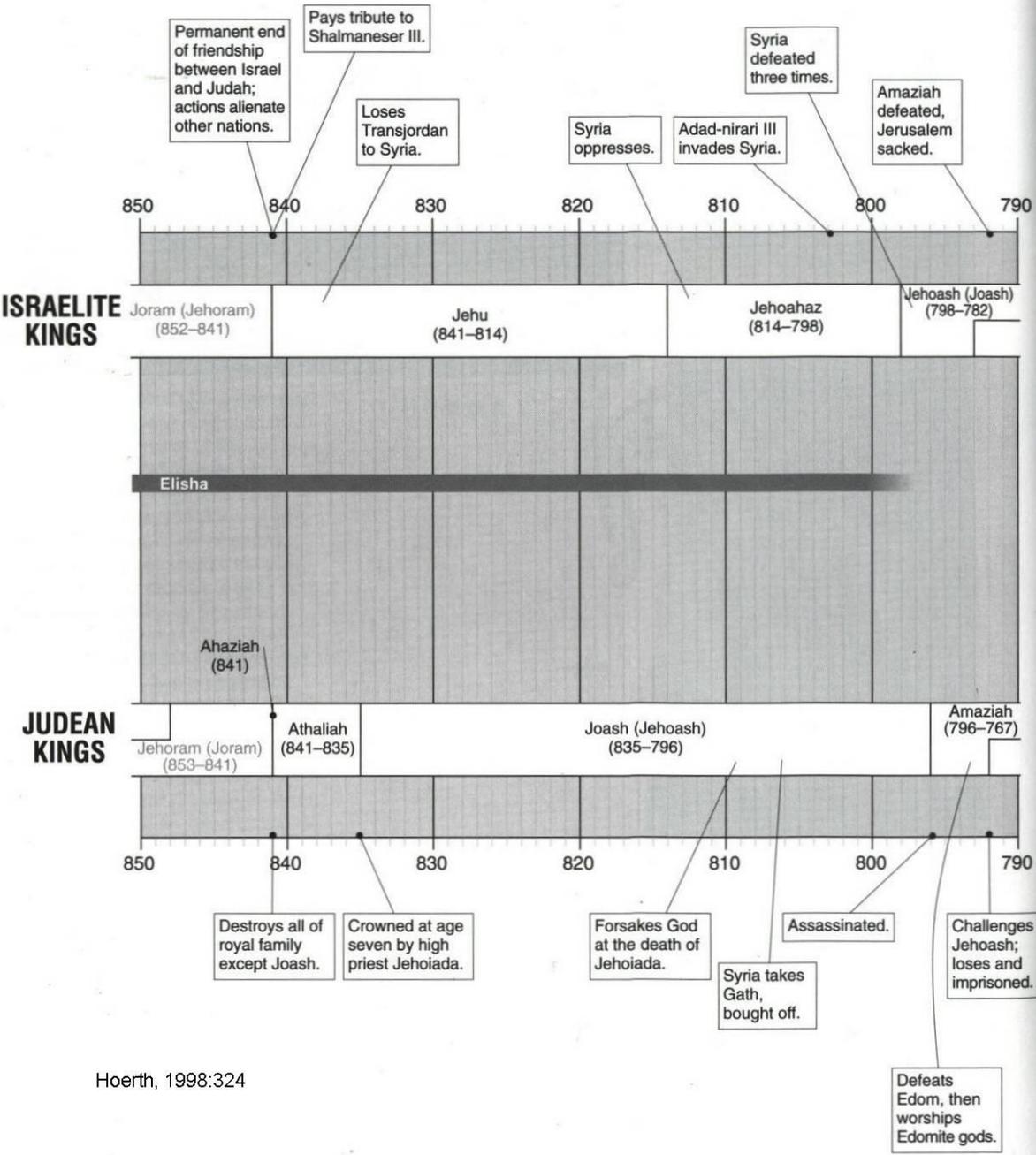
Hoerth, 1998, p. 304

CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY  
 PHOTO LINK: TIMELINE HOERTH 890-840 BC Israel + Judah; Hoerth, 1998:305.



Hoerth, 1998, p. 305

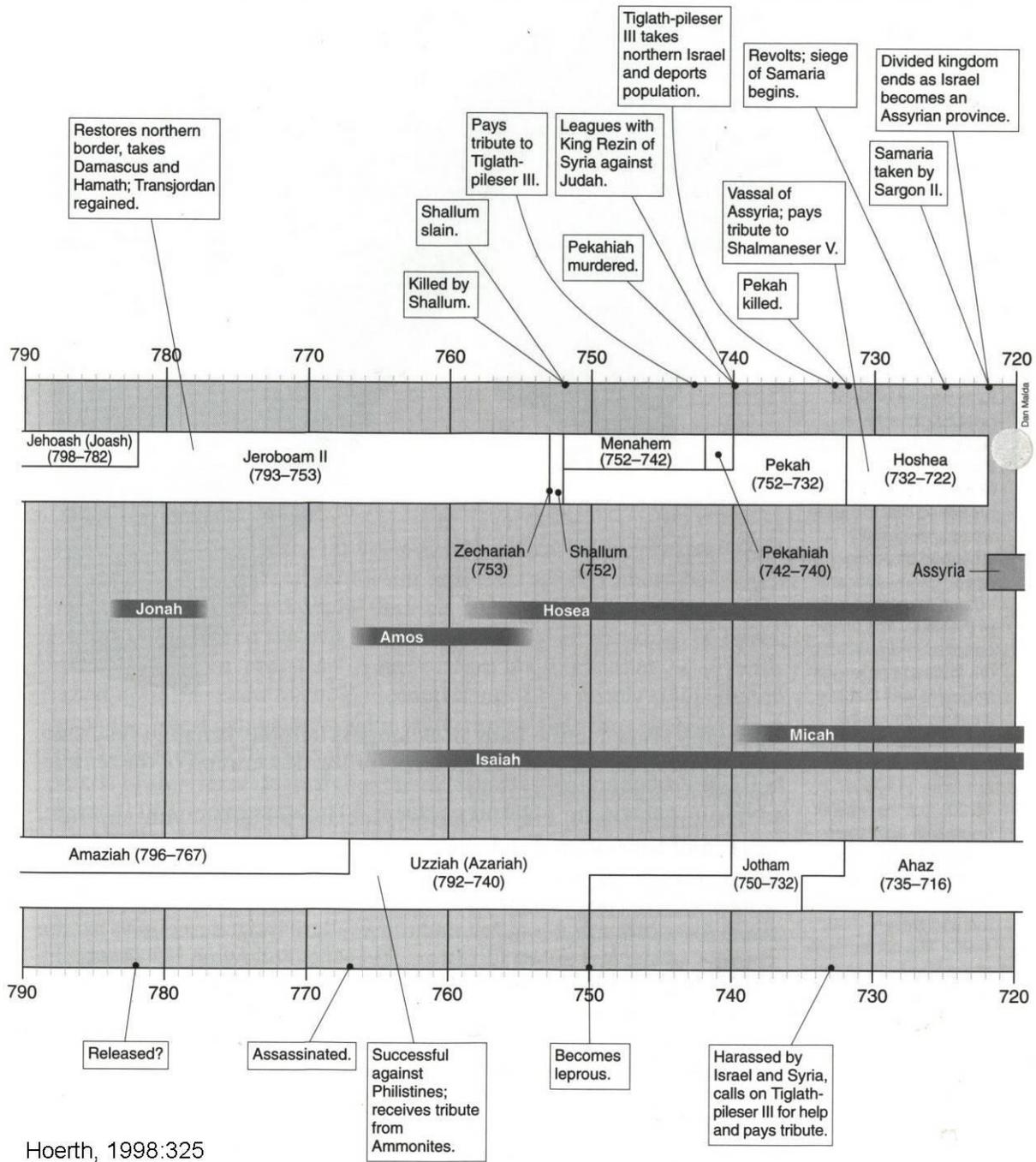
CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY  
 PHOTO LINK: TIMELINE HOERTH 850-790 BC Israel + Judah; Hoerth, 1998:324.



Hoerth, 1998:324

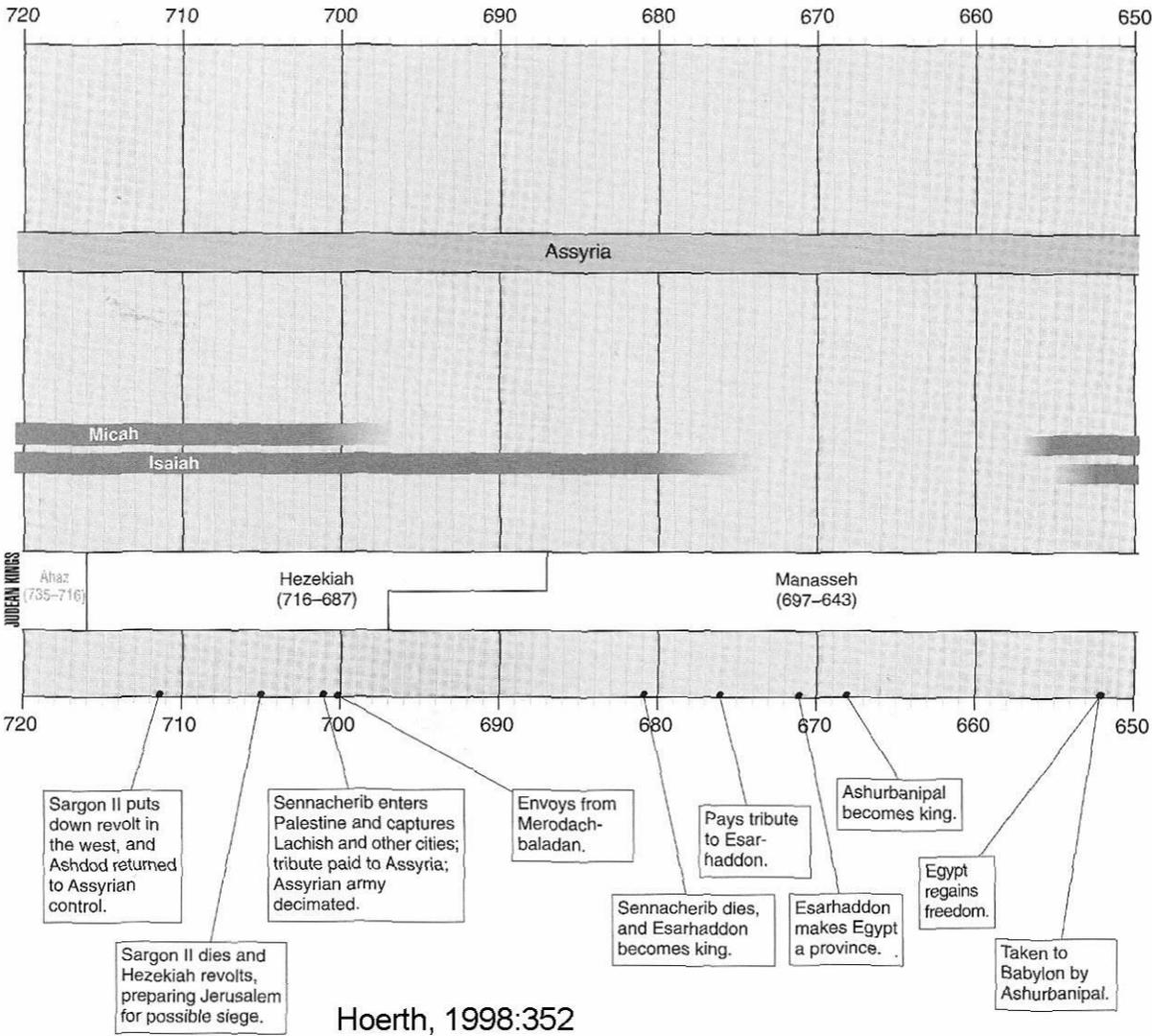
CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY

PHOTO LINK: TIMELINE HOERTH 790-720 BC Israel + Judah. Hoerth, 1998:325.

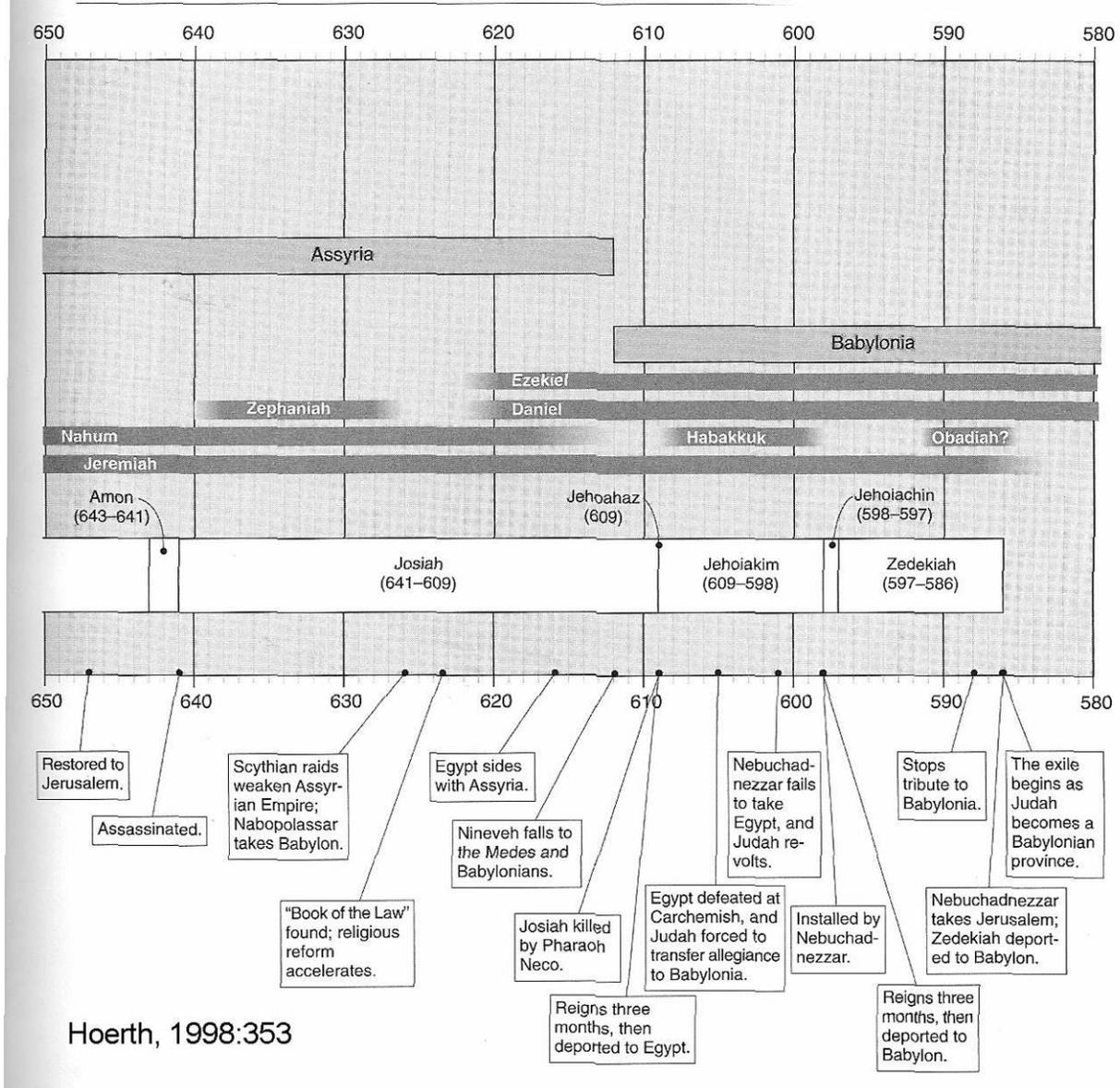


Hoerth, 1998:325

CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY  
 PHOTO LINK: TIMELINE HOERTH 720-650 BC Judah Alone; Hoerth, 1998:352.

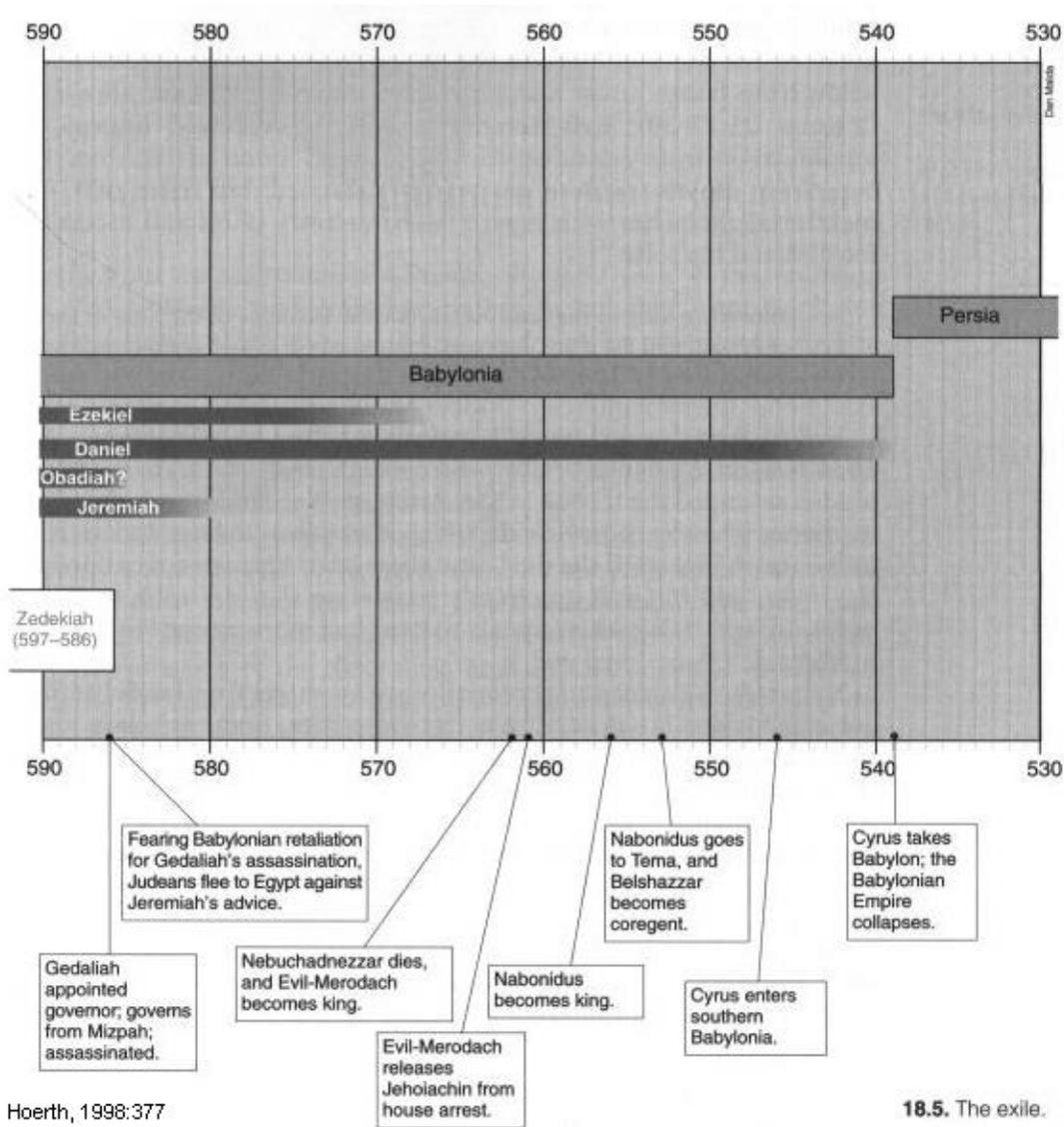


CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY  
 PHOTO LINK: TIMELINE HOERTH 650-580 BC; Hoerth, 1998:353.



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PHOTO LINK: TIMELINE HOERTH 590-530 BC Babylon + Persia; Hoerth, 1998:377.



Hoerth, 1998:377

18.5. The exile.

## ***Literary methods***

Here is an example of dating artifacts by literary method: A king's reign is known from some source such as a scroll, tablet, monument or artifact. If this king's name appears on a structure or artifact saying in effect "King so-and-so built this building", the building and artifacts are dated to the time of the king's reign. Our detailed knowledge of the dates and places in biblical lands comes from mainly from literary records of Egypt, Assyria, Babylonia and, of course, the Hebrews. A description of the scripts used by these different cultures is given in Chapter 4.

The development of biblical chronology is based on comparison of biblical and non-biblical historical texts. These permit the establishment a biblical chronology that is accurate, in many cases, to plus or minus one year according to our present Gregorian calendar. An overview of this literary dating method is given in Packer and others (1980:44-64), Hoerth (1998:57-59) and Kitchen (2001).

## ***Israel's Festival Calendar***

An understanding of Hebrew literary dating methodologies, in terms of our own absolute time scales, begins with Ancient Israel's seasonal festival calendar. The spring harvest was celebrated in the month of Abib which was the first month in the religious year (Exodus 23:15). The name of this month was changed after the Exile and was called Nisan. The summer wheat harvest was held in the month of Silvan and celebrated as the Feast of Weeks (Exodus 34:22). A second general harvest occurred in the autumn month of Ethanim (later re-named Tishri) and was celebrated by the Feast of Ingathering (Feast of Booths; Packer and others, 1980; Hoerth, 1998). The Hebrews used a lunar calendar. Passover was identified as the first new moon after the Autumn equinox.

Hebrew months were tied to a lunar calendar and were generally 30-days long, each month counted from the new moon. Some months, due to orbital variations, were 29 days long. This method of measuring time created a lunar calendar that was 11 days shorter than the solar year. So every other year, they added a 13<sup>th</sup> month. Annual hour shortages compared to the solar calendar required insertion of leap-year days in a 19-year cycle (Packer and others, 1980; Hoerth, 1998).

## ***First Months***

Dates were identified as the year and month in a ruler's reign. For example, 2 Kings 22:3 and 23:21-23 describe the discovery of the Book of the Law by Josiah's workman and the subsequent re-establishment of Passover observance on the traditional 14<sup>th</sup> day of Abib (Packer and others, 1980; Hoerth, 1998).

The Northern kingdom marked reigns of kings from the month of Abib (later Nisan, e.g. March-April) which was the beginning of the religious year. The Southern Kingdom of Judah generally counted official reigns from the month of Ethanim (later Tishri, September-October). But sometimes Judah (or later chroniclers) recorded dates using northern kingdom methodologies (Packer and others, 1980; Hoerth, 1998). In our dating

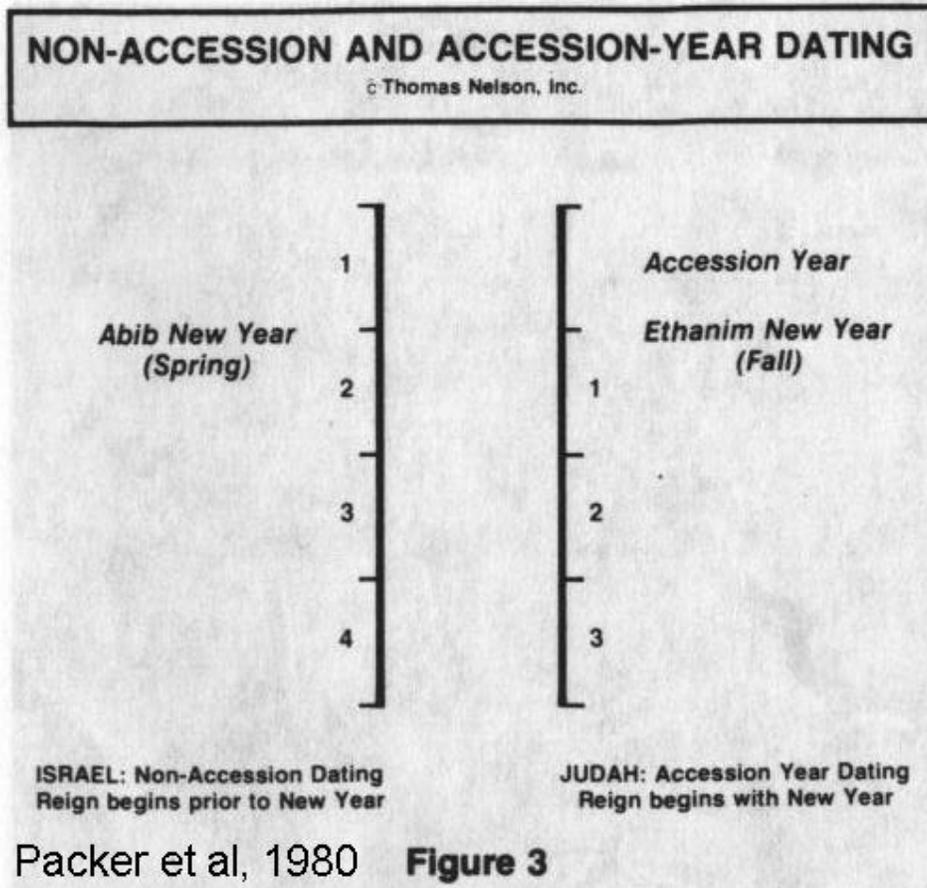
CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY

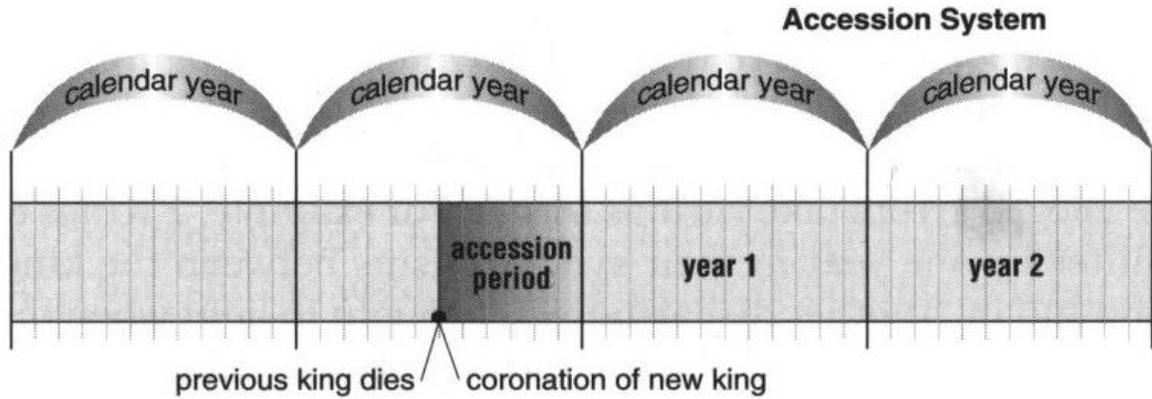
system, the year begins and ends in mid winter (January to December). In the Near East, years were counted from spring to spring (from Nisan to Adar in the Hebrew calendar) or from autumn to autumn (Tishri to Elul in the Hebrew system). Thus, an ancient Near East year included parts of two of our years. This is why there are so many double dates are reported for ancient events in archaeological literature. Solomon, for example began his reign in 971/970 (Kitchen, 2001:35).

**First Years**

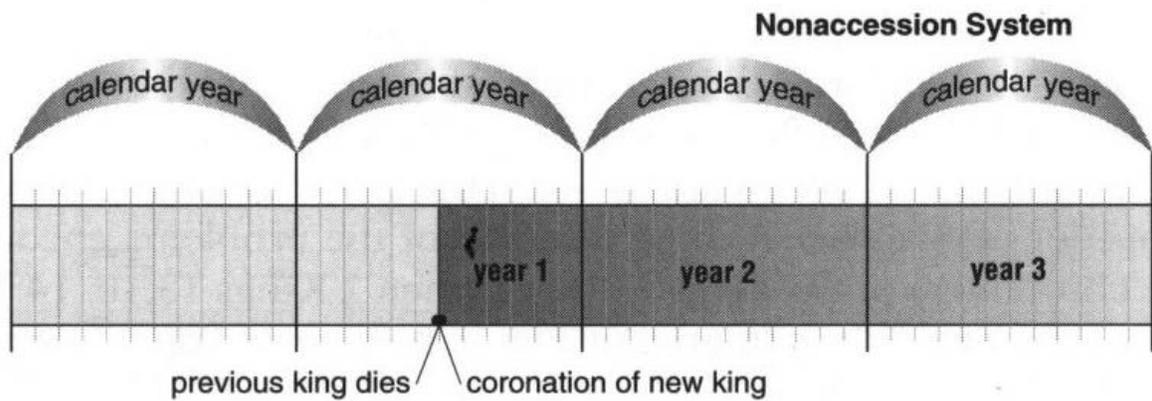
In addition to the two different starting-points for their calendars, the Northern and Southern kingdoms of ancient Israel had two systems for indicating what year a king took power, counting the year either before or after the traditional “inauguration” months of Abib (North, Israel) or Ethaniam (South, Judah) as “first year”. Apparently, there was no consistency in the choice of starting years--that was a decision made by the king himself. When a king chose to call the year in which he took power as his “first year”, scholars refer to this as *non-accession-year* dating. If he chose the year after he took power as “first year” (e.g. after the Abib or Ethaniam, following the commencement of his reign), that is called *accession year* dating. It appears that Israel usually employed non-accession year dating, and Judah usually employed the accession-year system. Judah used non-accession dating during the reign of Jehoram and other Judean kings when relationships between Israel and Judah were more friendly. Diagrams illustrating this dating technique are illustrated in Packer and others (1980:46, Figure 3) and Hoerth (1998:318 Figure 18.10).

PHOTO LINK: ACCESSION-YEAR DATING 001 Diagram Packer, 1980:46, Fig. 3.





Hoerth, 1998, *Archaeology and the Old Testament*, p. 318



### ***Overlapping Reigns***

A further complication for establishing absolute dates for Hebrew monarchies is that some kings had overlapping reigns as co-regents. This happened when orderly successions of power from father to son occurred and the son ruled for a few years along with his father (Packer and others, 1980; Hoerth, 1998).

### ***Comparison to Assyrian and Babylonian Records***

The Assyrians measured time against astronomical movements of stars. The science of archaeoastronomy allows for reconstruction of the positions of stars, planets and eclipses in the sky for any time in the past. Those reconstructions can be tied to Assyrian records and provide an absolute time scale with which to assign dates for the reigns of Assyrian kings from 892 to 648 B.C. During those years, Assyrian leaders had contact with Hebrew kings (Packer and others, 1980:44-46; Hoerth, 1998:318).

The Venus Tablets are a collection of Assyrian records for the risings and settings of the planet Venus, the morning and evening star. Several copies and fragments of these records have been found. The copies date from 7<sup>th</sup> century BC, but the original observations were made in the 17<sup>th</sup> century BC. Since Venus goes through cycles of



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PHOTO LINK: SOLAR ECLIPSE 002 View of total eclipse of Aug 11, 1999; Fred Espenak, 1999; <http://www.mreclipse.com/TSE99reports/TSE99reports.html>



This date can be used to establish absolute dates for rulers before and after the governorship of Bur-Sagale (Packer and others, 1980; Hoerth, 1998; Halpern, 2003:52). The “Canon of Ptolemy” gives the names and dates of all Persian and Babylonian Kings as far back in time as 767 BC. Those reigns can then be tied to the Guzana governorship of 763 BC and the absolute dates for biblical characters during the Persian and Babylonian empires deduced there from.

CHAPTER 1: INTRODUCTION TO BIBLICAL ARCHAEOLOGY  
 PHOTO LINK: PTOLMEY'S CANON 001 List of Kings from Nabonasser to Augustus;  
 ODY, 8:4:28.

THE EVIDENCE: KING LIST

### *Ptolemy's Canon*

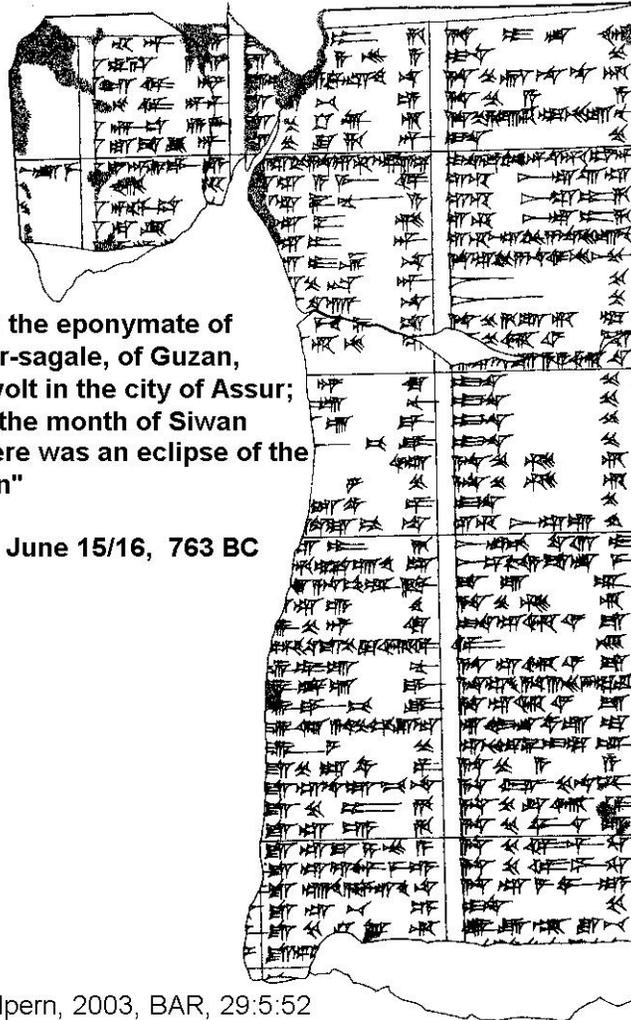
The Alexandrian astronomer-geographer Claudius Ptolemy (90-168 A.D.) compiled a list of successive kings of Babylon and Alexandria, presumably relying on earlier king lists. Ptolemy's Canon begins with the reign of Nabonassar, ruler of Babylon. The chart below includes the first 44 kings on the list: the Babylonian, Assyrian and Persian rulers of Babylon; and the Ptolemaic rulers of Alexandria. The 44th king is the Roman emperor Augustus, who annexed Egypt in 30 B.C. and reigned until 14 A.D.

RULER	YEARS REIGNED	DATE BEGINNING WITH NABONASSAR'S REIGN	
Nabonassar	14	14	
Nabu-nadin-zeri (Nadinu)	2	16	
Mukin-zeri and Pul	5	21	
Ululayu	5	26	
Merodach-baladan	12	38	
Sargon II	5	43	
First Kingless Period	2	45	
Bel-ibni	3	48	
Ashur-nadin-shumi	6	54	BABYLONIAN & ASSYRIAN
Nergal-ushezib	1	55	
Mushezib-Marduk	4	59	
Second Kingless Period	8	67	
Esarhaddon	13	80	
Shamash-shuma-ukin	20	100	
Kandalanu	22	122	
Nabopolassar	21	143	
Nebuchadrezzar	43	186	
Amel-Marduk	2	188	
Neriglissar	4	192	
Nabonidus	17	209	
Cyrus	9	218	
Cambyses	8	226	
Darius I	36	262	
Xerxes I	21	283	
Artaxerxes I	41	324	PERSIAN
Darius II	19	343	
Artaxerxes II	46	389	
Artaxerxes III	21	410	
Arses	2	412	
Darius III	4	416	
Alexander the Great	8	424	
Philip Arrhidaeus	7	431	
Alexander IV	12	443	
Ptolemy I Soter	20	463	PTOLEMAIC
Ptolemy II Philadelphus	38	501	
Ptolemy III Euergetes	25	526	
Ptolemy IV Philopator	17	543	
Ptolemy V Epiphanes	24	567	
Ptolemy VI Philometor	35	602	
Ptolemy VIII Euergetes II	29	631	
Ptolemy IX Soter II	36	667	
Ptolemy XII Neos Dionysus	29	696	
Cleopatra VII Philopator	22	718	
Augustus	43	761	ROMAN

Depuydt, 2005, ODY, 8:4:28

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PHOTO LINK: ASSYRIA 038 Tablet mentioning eclipse of sun on June 15-16 of 763 BC; Halpern, 2003. BAR, 29:5:52.



"In the eponymate of Bur-sagale, of Guzan, revolt in the city of Assur; in the month of Siwan there was an eclipse of the sun"

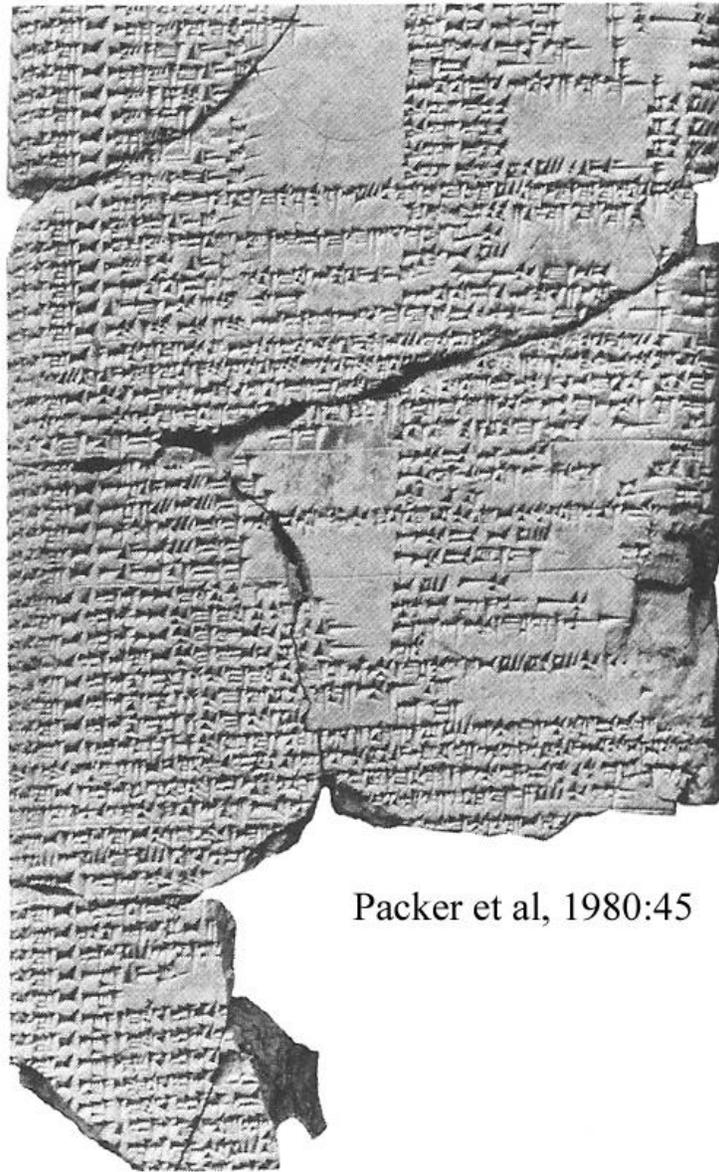
June 15/16, 763 BC

Halpern, 2003, BAR, 29:5:52

COURTESY OF ALAN MILLARD

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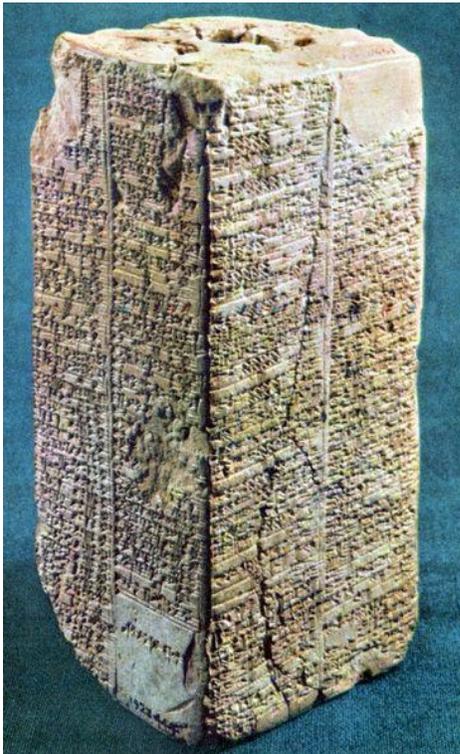
PHOTO LINK: ASSYRIA 047 Tablet with Assyrian calendar; Packer et al, 1980, The Bible Almanac, Thomas Nelson Publishers, Nashville, Tennessee, p. 45.



Packer et al, 1980:45

**Assyrian calendar.** This cuneiform tablet from Assyria ties the political events of the nation to movements of the planets and stars. Such calendars help modern scientists to figure the exact dates of key events in Assyrian history, which in turn allow us to calculate the dates of biblical events.

PHOTO LINK: SUMERIAN KING LIST 005 Sumerian king list Prism of Nippur; [www.losthistorical.com](http://www.losthistorical.com), Oct. 16, 2013.



Using the archaeoastronomical calculations, it was learned that the Assyrians fought the battle of Qarqar during the governorship of Daian-Assure who was serving “in the sixth year of king Shalmaneser III” e.g. in 853 B.C. During this battle, King Ahab of Israel was killed (Packer and others, 1980; Hoerth, 1998).

An Assyrian king list mentions a “King Ia-a-u” who began paying tribute to Shalmaneser III in the 18<sup>th</sup> year of Shalmaneser’s reign. It is generally agreed that this king was Jehu of Israel. This line of deduction yields a calculation of 841 BC for the date of Jehu’s tribute payment.

### ***Assyrian Kings in the Bible***

At one time, all Assyrian kings were only known from biblical passages. Prior to the 1700’s, there were no discoveries in Iran and Syria that provided clay tablets and other archaeological records to confirm and supplement the biblical accounts. Assyrian records now allow for reconstruction of biblical chronologies. There is a close parallelism of Hebrew and Assyrian texts for this period show that the Hebrew sources were originally set down in writing near the time of occurrence of those kingships. The Hebrew record was not changed by any compiler or editor of Kings of Isaiah during the Babylonian Exile or even later, when Assyrian forms had become obsolete (Millard, 1976).

Stern (2000), contrasts the archaeological record of the NeoBabylonian and Assyrian periods. The earlier Assyrian destructions of 722 BC are well-known, because the Assyrians rebuilt immediately after their conquests. The later NeoBabylonian record of the destruction for 586 BC is less well documented because they did not rebuild. This history left a gap in the archaeological record for most sites in Palestine from 604 to 538 BC. The earlier Assyrian conquest and occupation of the Northern Kingdom is well illustrated by both their destruction **and** their post-destruction building activity. Four stone memorial stelae erected by Assyrian kings have been recovered from Samaria, Asdod, Ben-Shemen and Kakun.

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PHOTO LINK: ASSYRIA 004 Memorial stela from Ashdod, conquered by Sargon II in 711 BC ; Stern, 2000, BAR, 26:6:47;



Administrative cuneiform tablets are known from Sepphoris, Tell Keisan, Samaria, Gezer and Hadid. An important Assyrian find is the Lamastu tablet of Lachish. The Assyrians rebuilt the line of fortresses along the Via Maris and introduced new architectural styles such as replacement of the 4-room house with the Mesopotamian open-court house (Millard, 1976).

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PHOTO LINK: FOUR ROOM HOUSE 006 Four-room house a Samaria. Bunimovitz and Faust, 2002, BAR, 28:4:36



Bunimovitz and Faust, 2002, BAR, 28:4:36; Photo by Zev Radovan

PHOTO LINK: MEGIDDO 006 Location map of Megiddo with Via Maris, Cline, 2000, BR, 16:3:27.



Cline, 2000, BR, 16:3:27

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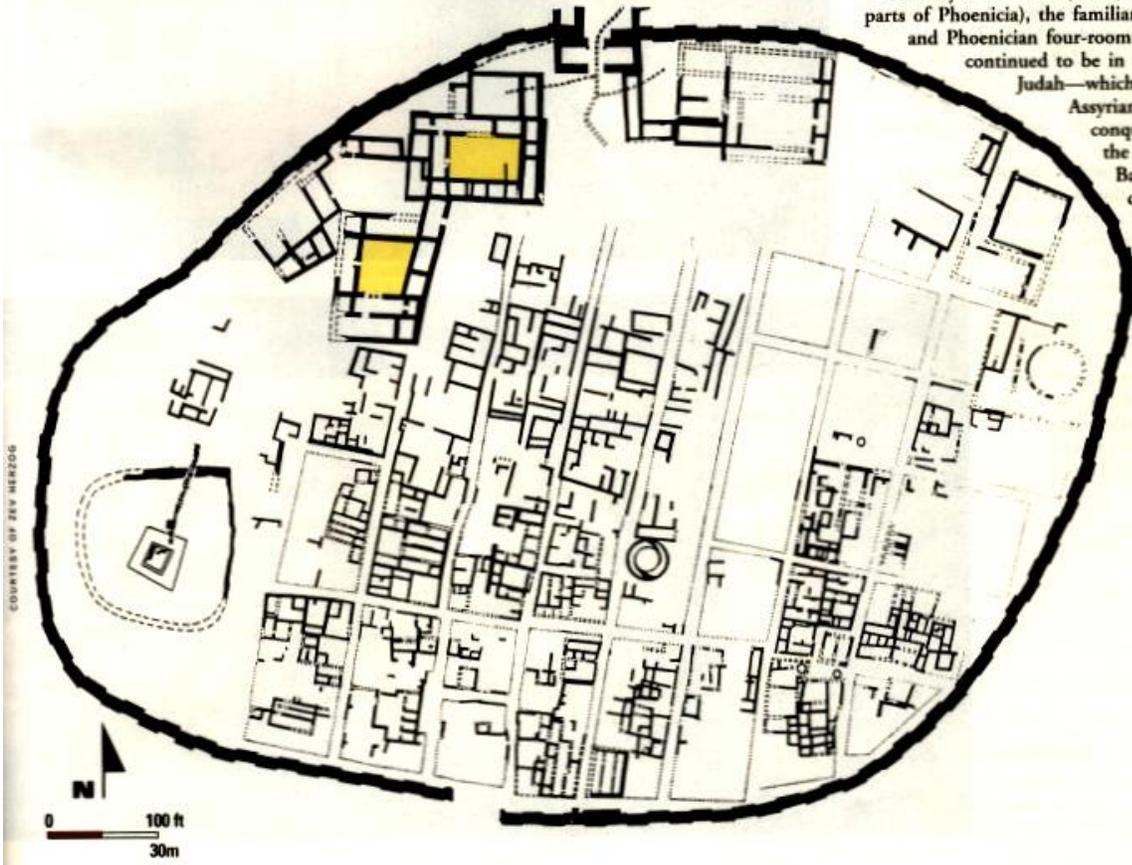
PHOTO LINK ASSYRIA 005 Open court Mediteranian style buildings, Hazor and Meggido, 8th century BC; Stern, 2000, BAR, 26:6:49.



ASSYRIAN INFLUENCE on the culture of Palestine is shown by the remains of buildings with an open-court design (photo at left). As the plan below indicates, open-court buildings had a large central courtyard (highlighted in two of the buildings on the plan), around which several smaller rooms were arranged. This design was common in Mesopotamia long before the Assyrians conquered Israel, but it does not appear in Palestine until the late eighth century B.C.E., when the Assyrians started rebuilding many of the towns they had earlier destroyed. As new construction went forward, the open-court design replaced the four-room building plan that had previously been favored in Israel and Phoenicia.

The remains shown in the photograph are from Hazor, about 10 miles north of the Sea of Galilee, while the drawing below is of Megiddo. After the Assyrians rebuilt Megiddo, they made it the capital of an imperial province comprising Galilee and the Jezreel Valley. Although the open-court structure became common in areas directly under Assyrian control (Israel, Philistia and parts of Phoenicia), the familiar Israelite and Phoenician four-room design continued to be in use in Judah—which the

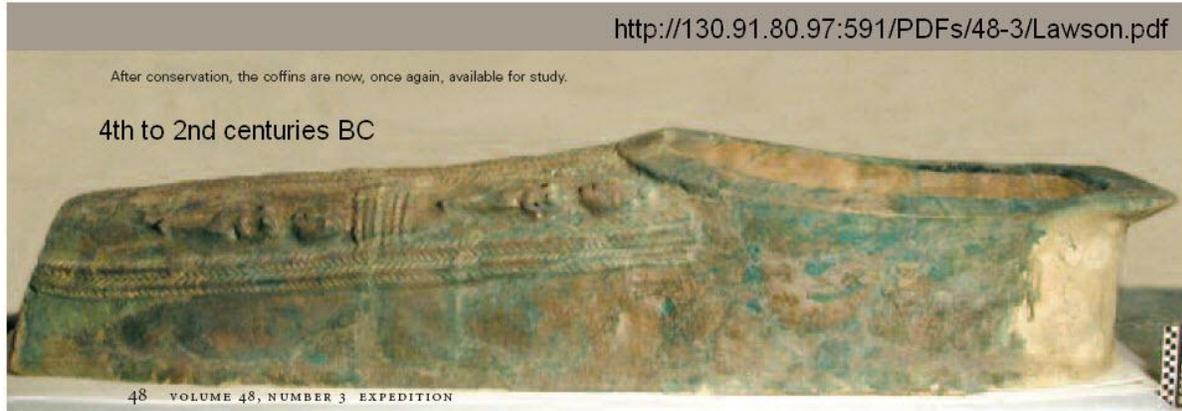
Assyrians did not conquer—up to the time of the Babylonian conquest.



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Burial customs changed to include Assyrian clay coffins at Dor, Megiddo, Tell el-Qitaf, Dothan, Samaria, Tell-el-Far'ah (north) and Jezreel (Millard, 1976, Lawson, 2007).

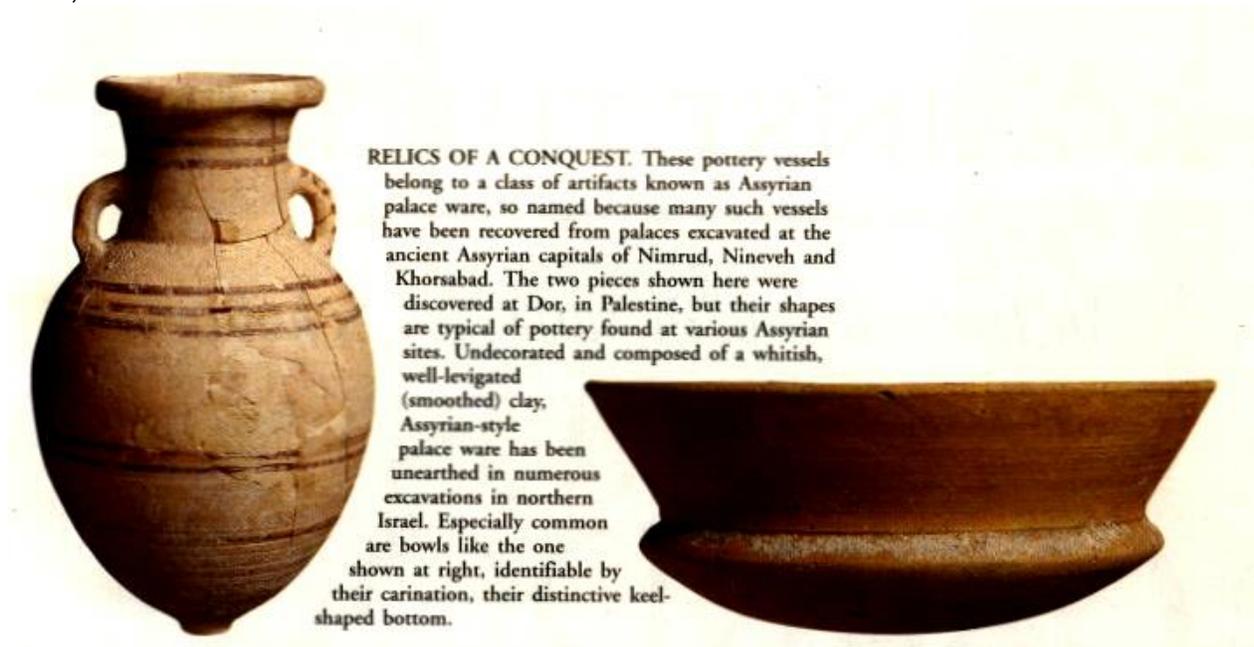
PHOTO LINK: ASSYRIA 051 Assyrian Clay Coffin from Nippur 4th to 2nd century BC; <http://130.91.80.97.591/PDFs/48-3/Larson.pdf>.



Assyrian clay coffin from Nippur. Lawson, Oct. 13, 2007

Assyrian palace ware and its locally made imitations are common in all Northern Israel sites as are Assyrian reliefs, stone vessels, metal artifacts and imported seals

PHOTO LINK: ASSYRIA 007 Assyrian "palace ware" pottery from Dor; Stern, 2000, BAR, 26:6:51



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PHOTO LINK ASSYRIA 006 Imported Assyrian seals, Stern, 2000, BAR, 26:6:50.

**BENEATH A CRESCENT MOON,** an Assyrian king holds up an offering bowl to the radiant figure of the god Assur, who raises both of his hands as a sign of blessing (at right). The image is from an Assyrian stamp seal (at left in the photo), shown here beside a modern impression made by pressing the seal into wet clay.

Archaeologists discovered the seal in a residential section of Dor, an Israelite and Phoenician coastal city located about 12 miles south of modern Haifa. Destroyed by the Assyrians in 733 B.C.E., Dor, like Megiddo, was soon rebuilt. Thereafter, it became the administrative center of an Assyrian province that included the Carmel and Sharon coasts.

The cylinder seal below, also found at Dor and also shown with a modern clay impression, depicts a king doing battle with two horned griffins—a common Assyrian ornamental motif. Palm trees bracket the scene, which also includes two incense altars, one on each side of the king. Like the stamp seal, the cylinder seal may have been used by Assyrian officials in the course of their administrative duties at Dor.



Stern, 2000

BAR, 26:6:50

Glyphic art changed from Phoenician-Israelite archetypes to Assyrian glyphic types following the Assyrian invasions.

The Assyrian archaeological record in Palestine indicates that after the destruction and initial deportations, a reversal of policy occurred that encouraged rebuilding, economic development, trade and importation into Palestine of many people from other lands on a grand scale.

Nine Hebrew kings are mentioned in Assyrian records, as summarized in the table, below:

**Five Assyrian Kings Named in the Bible**

(Wood, 1991a)

<b>Assyrian King</b>	<b>Dates (BC)</b>	<b>Biblical Passages</b>	<b>Biblical Contemporaries</b>
Tiglath-pileser III	745-727	2 Kings 15:19,29; 16:7,10 and 1 Chron 5:6,26 and 2 Chron 28:20	Menahem, Pekahiah, Pekah and Hoshea of Israel; Rezin of Damascus; Uzziah, Jotham, Ahaz and Hezekiah of Judah; <i>Prophets Micah, Isaiah, and Hosea.</i>
Shalmaneser V	726-722	2 Kings 17:3, 18:9	Hoshea of Israel; Ahaz of Judah; Prophets Micah, Isaiah and Hosea.
Sargon II	721-705	Isaiah 20:1	Ahaz and Hezekiah of Judah; <i>Prophets, Micah, Isaiah, and Hosea.</i>
Sennacherib	704-681	2 Kings 18:13, 19:16,20,36 and 2 Chron 32:1,2,9,10,22 and Isaiah 36:1; 37:17,21,37	Hezekiah and Manasseh of Judah; <i>Prophets Micah and Isaiah(?)</i>
Esharhaddon	680-669	2 Kings 19:37 and Isaiah 37:38 and Ezra 4:2	Manasseh of Judah

### ***Comparison to Mari Records***

The Mari civilization of Syria existed from c. 2900 BC until its conquest by the Acadians in 2340 BC. (<http://www.middleeast.com/mari.htm>, Mar. 29, 2005). The **Mari Tablets** were discovered in 1933 at Tell Hariri on the west bank of the Euphrates. There were 20,000 of them (<http://www.angelfire.com/nt/theology/13babyln.html>, Mar. 29, 2005).

They indicate that Hammurabi of Babylon, Shamshi-Adad of Assyria, and Zimri-Lim of Mari were contemporaries. Since Hammurabi's rule was from 1848 to 1704 BC, the dates of Mari kingships can also be identified by their known association with him.

PHOTO LINK: MARI 001 Location Map of Mari and othe Mesopotamian cities ; <http://www.angelfire.com/nt/theology/13babyln.html> ; Sept. 20, 2005

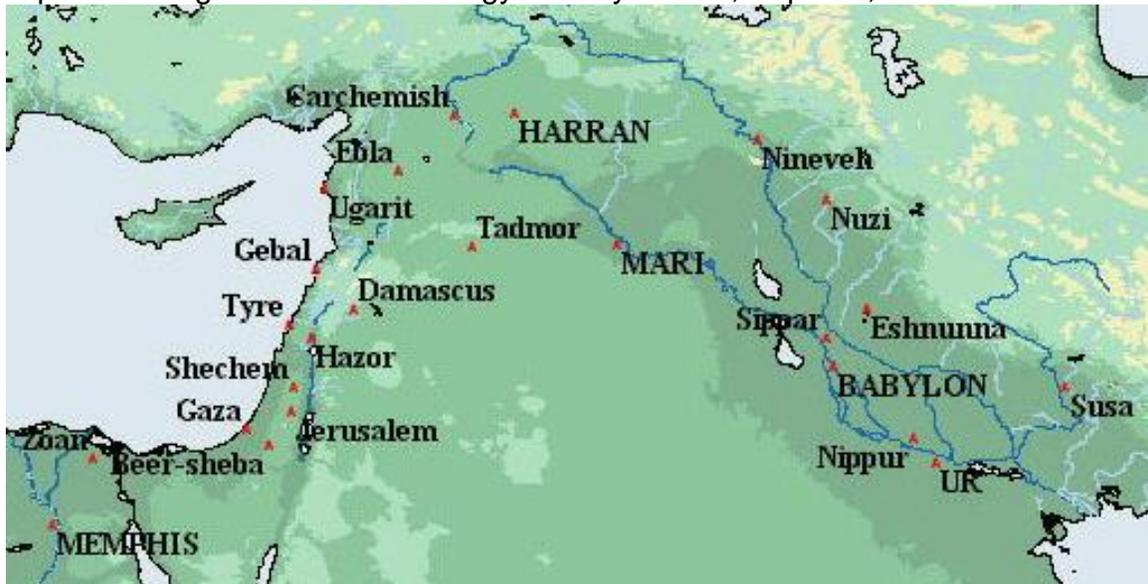


PHOTO LINK: MARI TABLET 001 Tablet of King Zimri-Lim of Mari, ca. 1780 BC, Louvre Museum;

[http://www.homsonline.com/images/Mari/Mari\\_TabletKingZimriLim.jpg](http://www.homsonline.com/images/Mari/Mari_TabletKingZimriLim.jpg); Oct. 9, 2010



### ***Comparison to Egyptian Records***

Independent verification of a Biblical chronology based on Assyrian records is possible by comparison to those of Egypt. The Egyptians marked years from summer to summer (unlike the other systems described above) and they had no leap year. Their calendar had 365 days in the year, so that system lost a day every four years. The calendar moved through the seasons in a  $(4 \times 395 =)$  1,460 year cycle. This cycle was related to the rising of the Egyptian goddess-star Sirius. This star is the brightest star in the sky. It is the brightest star the constellation Canis Major, the "Big Dog". Sirius is also called the "Dog Star." The 1,460-year cycle is called the Sothic cycle because "Sothic" means "pertaining to Sirius" (Depuydt, 2005:32-33).

The Aramaic Papyri from Elephantine Island are an important source of chronological information for Egypt. They were produced at a time when Greeks

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ruled the Nile Delta, and so the dates in the Papyri are given according to both Babylonian and Egyptian calendars. The double dates form a basis for linking and comparing those calendars and assigning exact dates from our contemporary calendar to them. (Depuydt, 2005:31)

PHOTO LINK: ELEPHANTINE PAPYRI 001 Letter of Nov. 27, 407 BC. Porten. 1995, BAR, 21:3:63.

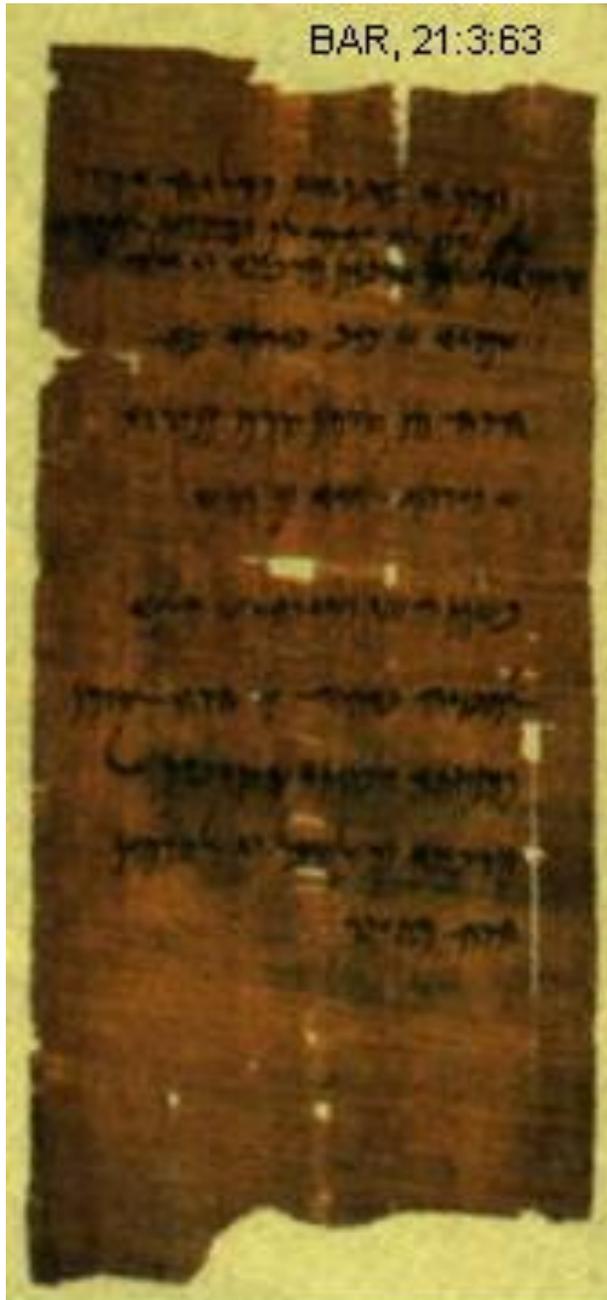


Elephantine Papyri of Jedaniah, Nov. 25, 407 BC.

BAR, 21:3:63

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PHOTO LINK: ELEPHANTINE PAPYRI 002 Reply to Nov 27, 407 BC Letter.  
Porten, 1995, BAR, 21:3:63.



The Apis Bull inscriptions are another source of precise chronologic data for Egyptian pharaohs back to 664 BC. The Apis cult existed in the earliest Egyptian dynasties, and the bulls were associated with particular pharaohs. The bulls were important manifestations, or heralds, of the creator-god Ptah. The Apis Bull inscriptions were found at Memphis, 15 miles south of modern Cairo. Only one Apis Bull lived at any one time, and when they died, a day of national mourning was declared. The bull was embalmed and transported to Saqqara where it was placed in underground catacombs. Those catacombs have mummified bulls, massive stone sarcophagi, and stele dedicated by high priests at the death of each bull. The dates of the death of each bull are recorded on the sarcophagi. Compilation of all the dates on the various sarcophagi produce a list of Apis Bulls that can be related to every Egyptian pharaoh (Depuydt, 2005:32).

Reply to Jedaniah's letter  
Photo B and K Zuckerman

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PHOTO LINK: APIS BULL INCRPTIONS 001 Massive sarcophagai, Memphis 664 BC; Depuydt, 2005, Archaeological Odyssey, 8:4:32.

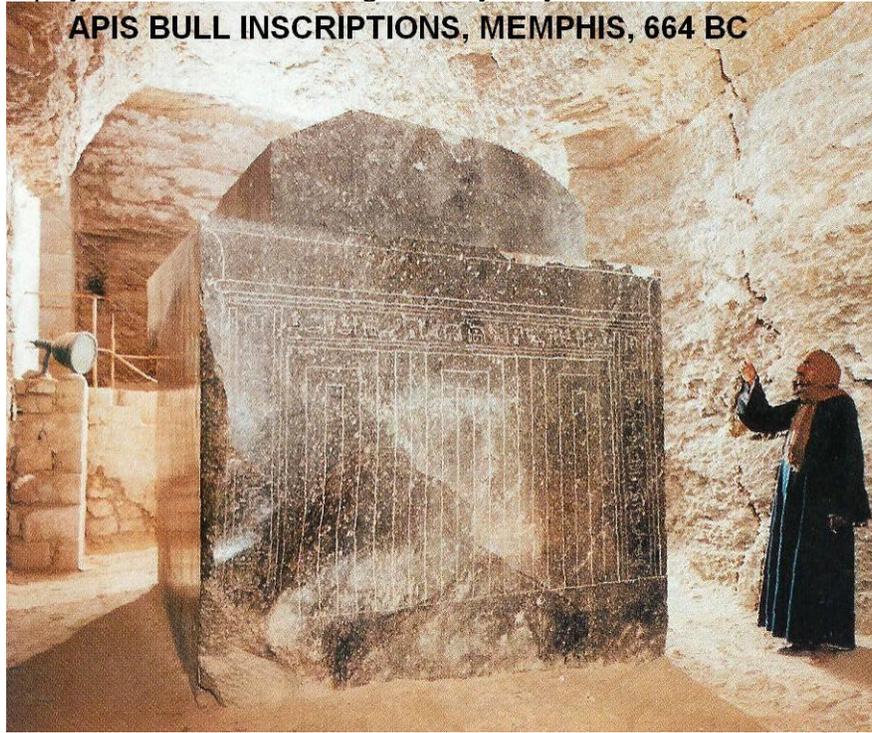
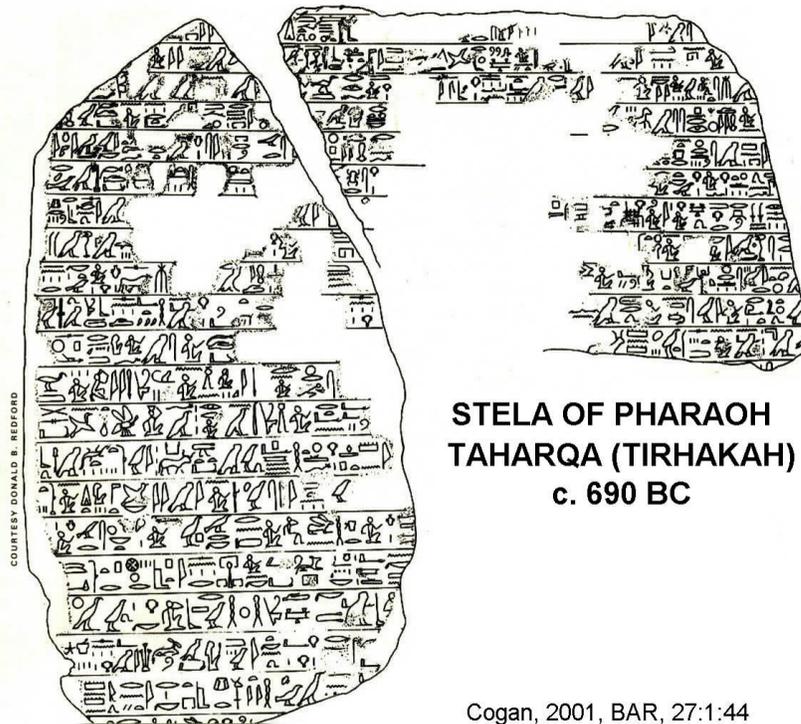


PHOTO LINK: EGYPT 019 Stela of Pharaoh Taharqua (Tirhakah) drawing . Cogan, 2001, BAR, 27:1:44.



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PHOTO LINK: EGYPT 018 Pharaoh Tirhakah (Taharqa); Shea, 1999, BAR, 25:6:39.



Pharaoh  
Tirhakah  
of  
Ethiopia  
c. 690 BC  
2 Ki 19:9

The Egyptian 25th Dynasty began in 664 BC with the death of Ethiopian Pharaoh Taharqa (Biblical Tirhakah) who ruled 26 years (Caminos, 1952; Kitchen, 1977; cited by Kitchen, 2001:58)

BAR  
25:6:39

Shea, 1999

PHOTO LINK: EGYPT 020 Bust of Pharah Taharqua (Tirhakah). Cogan, 2001, BAR, 21:1:44

Cogan, 2001  
BAR, 27:1:44



**PHARAOH TAHARQA, c. 690 BC**

He was the last ruler in Dynasty 25. So his rule started in 690 BC. The two Pharaohs before him ruled 25 years. That means that the 22nd Dynasty ended in 715 BC (Kitchen, 1996a; 1996b; Randsborg, 1996; Manfred, 2000; Bietak, 2000; all cited by Kitchen, 2001:58). Going back in a line of 10 kings, we come to Sheshonq I (Shoshenq I; Biblical Shishak). That Pharaoh invaded Judah in the 5<sup>th</sup> year of Rehoboam's rule (1 Kings 14:25-26; 2 Chron. 12:1-9). The attack on Israel is described in Sheshonq's victory stela. Depending on how the reigns of these 10 kings are added, we get 227 or 230 years. The difference is due to the fact that a king's reign in an incomplete year might be short (by two months) or long (by 10 months). Over the centuries, these discrepancies could add up to several years. Adding 230 to 715 gives the beginning of Sheshonq's rule: 945 BC. He invaded Palestine in his 20<sup>th</sup> or 21<sup>st</sup> year, or 926/925 BC. Shortly thereafter he built a victory stele at Silisila and began massive building projects including a huge triumphal scene at the Karnak Temple of Amun in Thebes (Caminos, 1952; Kitchen, 1977; cited by Kitchen, 2001:58).

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The invasion of Palestine took place in the 5<sup>th</sup> year of Rehoboam. Adding 5 to 926/925 gives a date for the death of Solomon at 931/930 BC, exactly the same as the date arrived at through Assyrian chronology (Kitchen, 2001:35).

### *Hebrew Kingships*

From knowing absolute dates for the death of King Ahab (853 B.C.) and the tribute of Jehu (841 B.C.) the dates of the other Hebrew monarchs can be deduced from descriptions of their reigns in books of Samuel, Kings, Chronicles and the Prophets. These interpretations yield the following reconstruction (Packer and others, 1980; Hoerth, 1998; Kitchen, 2001):

#### The United Monarchy

King	Years BC
Saul	1030-1009
Isbosheth and Abner	1011-1004
David	1009-to 971/970
Solomon	971-931/930

#### The Divided Kingdoms (Dates from Kitchen, 2001:34)

NORTHERN (ISRAEL) KING	DATES BC	SOUTHERN (JUDAH) KING	DATES BC	EXTRA-BIBLICAL SOURCE MATERIAL
<b>Jeroboam</b>	<b>931-908</b>	<b>Rehoboam</b>	<b>931-913</b>	<b>Sheshonq's victory relief at Karnak, 925 BC and stela at Silisila, 924 BC commemorating his invasion of Judah and Israel</b>
Nadab	908-907	Abijam	913-911	
Baasha	907-884	Asa	911-870	
Elah	884-883			
Tibni	883			
Zimri	883			
Omri	883-872			
Ahab	872-853	Jehoshapat	870-846	
<b>Battle of Qarqar (Qargar)</b>	<b>Death of Ahab 853</b>			<b>Annals of Shalmanesser III 853-852 BC</b>
Ahaziah	853-852	Jehoram	846-841	

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NORTHERN (ISRAEL) KING	DATES BC	SOUTHERN (JUDAH) KING	DATES BC	EXTRA-BIBLICAL SOURCE MATERIAL
Joram	852-841	Ahaziah	841	
Jehu	841-818	Athaliah	841-835	
<b>Jehu's Tribute</b>	<b>To 841</b>	<b>Shalmanesser III</b>	<b>III</b>	<b>Annals of Shalmanesser III 841/349 BC)</b>
Jehoahaz	818-802	Joash	835-801	
Jehoash	801-787	Amaziah	801-783	
Jeroboam II	787-748	Azariah ("Uzziah")	783-732	
		Jotham	750-735	
Zechariah	748-747			
Shallum	747			
Menachem	747-738			
Pekahiag	742-740			
Pekah	740-732	Ahaz	735-727	
Hoshea	732-722	Hezekiah	727-697	
<b>Fall of Israel</b>	<b>723/722</b>			
		Manasseh	696-642	
		Amon	642-640	
		Josiah	639-609	
		Jehoahaz	609	
		Jeholiakim	609-598	
		Jehoiachin	598-597	
		Zadeloai	597-586	
		Gedaliah	586 (7 months)	
		<b>Fall of Jerusalem</b>	<b>586</b>	

Biblical history before the Omri dynasty cannot be tied with great assurance to non-Hebrew records or archaeo-astronomical events. Nevertheless, information in the Bible can be used to extend a chronology back before the Omri dynasty (Packer and others, 1980; Hoerth, 1998).

### **Judges**

The period of the Judges was from the death of Moses to the ascension of Saul. The chronologies for this period are dependent on the date of the Exodus for which there is considerable disagreement (see below). Conservative analysis

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permit the following reconstruction (see Packer and others 1980, page 52):

<b>Dates of Events in Judges</b>		
<b>Description</b>	<b>Reference</b>	<b>Dates B.C. (assuming Exodus in 1440 B.C.)</b>
Assume 5 years apostasy		1380-1375
<b>Oppression</b> , 8 years	Judges 3:8	1375-1367
Deliverance by Othniel, 40 year's rest	Judges 3:11	1367-1327
Assume 5 years apostasy		1327-1322
<b>Oppression by Moab</b> , 18 years	Judges 3:14	1322-1304
Deliverance by Ehud, 80 years rest	Judges 3:31	1304-1224
Deliverance by Deborah, 40 years rest	Judges 5:31	1224-1184
<b>Oppression by Midian</b> , 7 years	Judges 6:1	1184-1177
Deliverance by Gideon, 40 years rest	Judges 8:28	1177-1137
Abimelech's reign, 3 years	Judges 9:22	1137-1134
Tola and Jair, 45 years	Judges 10:2-3	1134-1089
Jephthah, 6 years	Judges 12:7	1089-1083
Ibson, Elon and Abdon, 25 years	Judges 12:9, 11, 14	1083-1058

### ***Moses, the Exodus and Conquest***

There is much discussion and speculation about the date and nature of the Exodus and the Conquest. Conservatives place these events in the 15<sup>th</sup> century BC and believe in a military conquest of Palestine by Israelites while liberals think the events (or allegorical stories) "happened" in the 13<sup>th</sup> century and believe that the "conquest" was more an assimilation of Israelite culture by local Canaanites (more on this later). The following discussion is based on the information in Packer and others (1980, p. 50).

### **Early Dates**

First Kings 6:1 says that Solomon began building the Temple in the fourth year of

his reign in the second month (Ziv), 480 years after the commencement of the Exodus. Solomon began to rule in 971 B.C. so the Temple building started in 967/966 BC (based on the fall-to-fall dating system). Adding 480 to 967 gives 1446 as the date for the Exodus. Subtracting 40 years wandering, gives **1406 BC** as the date for the Conquest. Judges 11:26 says that the judge Jephthah ruled when Israel had occupied Canaan for 300 years, which means that Jephthah lived in (1406-300=) 1106 BC. This puts the Israelites in Egypt at a time when other foreign peoples were invading Egypt, who, in some sources, are called the *Habiru*. That word sounds like "Hebrew", but may not include, or refer exclusively, to Israelites (Packer and others, 1980; Hoerth, 1998).

### **Late Dates**

The "late dates" were the most widely-held interpretation of the dates for the Exodus and Conquest up to the 1990's and still have broad academic support. This chronologic reconstruction identifies the Pharaoh of the Oppression as belonging to Egypt's 19<sup>th</sup> dynasty, which began in 1318 BC. According to this interpretation, the Exodus happened during the reign of Rameses II (ca. 1304-1238 BC; see Packer and others, 1980; Hoerth, 1998).

### ***Geochemical methods***

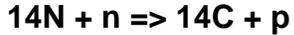
A discussion of the fundamental principles in geochemical methods of absolute dating are provided in Appendix 4. Here I provide an overview of geochemical dating methods used to date archaeological objects back to the dawn of civilization.

### **Carbon-14**

A variety of geochemical techniques have been developed to directly date archaeological artifacts.

The most common is Carbon-14 ("C-14") dating. A comprehensive discussion of the Carbon-14 dating method is found in Higham (2004; <http://www.c14dating.com>). In use since the early 1950's, this method has undergone improvement and is now used to date artifacts and organic remains from 100 to 50,000 years old. Only a few micrograms of material are needed for an analysis today using atomic mass spectrometer technology. The method is based on the presence of radioactive C-14 atoms in all living things. Radioactive C-14 is produced in the upper atmosphere by cosmic (neutron) ray bombardment of Nitrogen-14 (N-14). The fast-flying neutrons knocks a proton out of the N-14 nucleus (which has seven neutrons, seven protons) and replace it with a neutron. This changes it to a C-14 atom (six neutrons, eight protons). The reaction is:

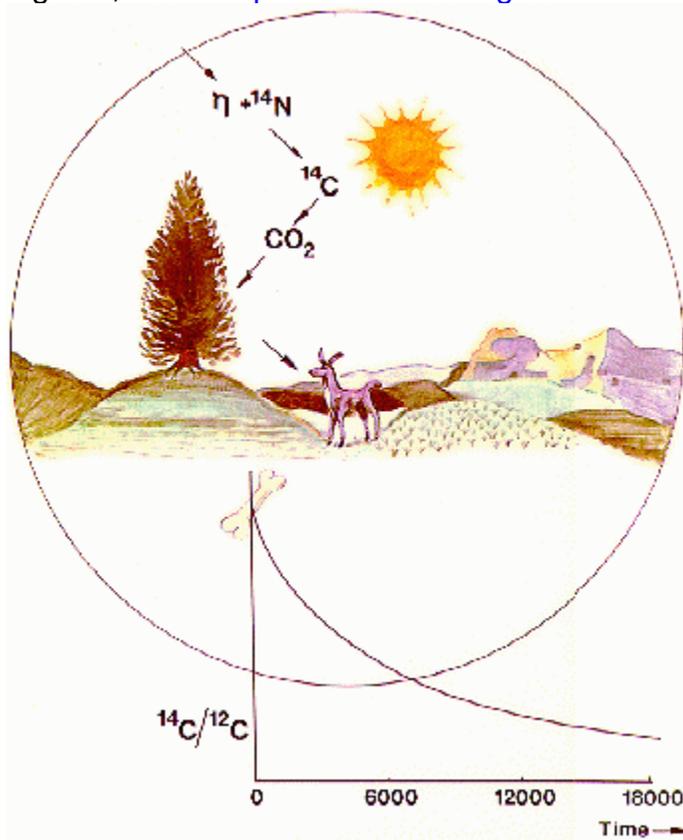
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(Where n is a neutron and p is a proton).

C-14 in the atmosphere is taken up by plants during photosynthesis (via carbon dioxide) and those plants are eaten by animals. Throughout an plant or animal's life, the relative amount of C-14 atoms in its tissues compared to non-radioactive C-12 atoms is in equilibrium because at any given time in history, the world-wide atmospheric and terrestrial ratio of C-12 to C-14 is the same. While an organism is living, the C-14 lost to decay is replenished by "new" C-14 that it takes in from the atmosphere (plants) or ingests (animals).

PHOTO LINK: CARBON 14 DATING 006 Diagram of formation and decay, Tom Higham, 2004. <http://www.c14dating.com/>



Once a plant or animal dies, it stops taking in C-14 and so, as the C-14 decays back to N-14, the C-14/C-12 ratio begins to change. As  $^{14}\text{C}$  decays it emits a weak beta particle ( $b$ ), or electron. The decay can be shown by this equation:



Measuring the ratio of C-14 to C-12 gives a measurement of the time elapsed since the death of the plant or organism (when intake of C-14 ceased). Time is measured using an equation that uses the rate at which C-14 decays to N-14.

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That rate is called the “half life”. The half life is the time it takes for an artifact to loose 50% of it's C-14. The half life for C-14 is 5,730 (+/- 40) years.

The percentage of carbon isotopes in the present atmosphere is:

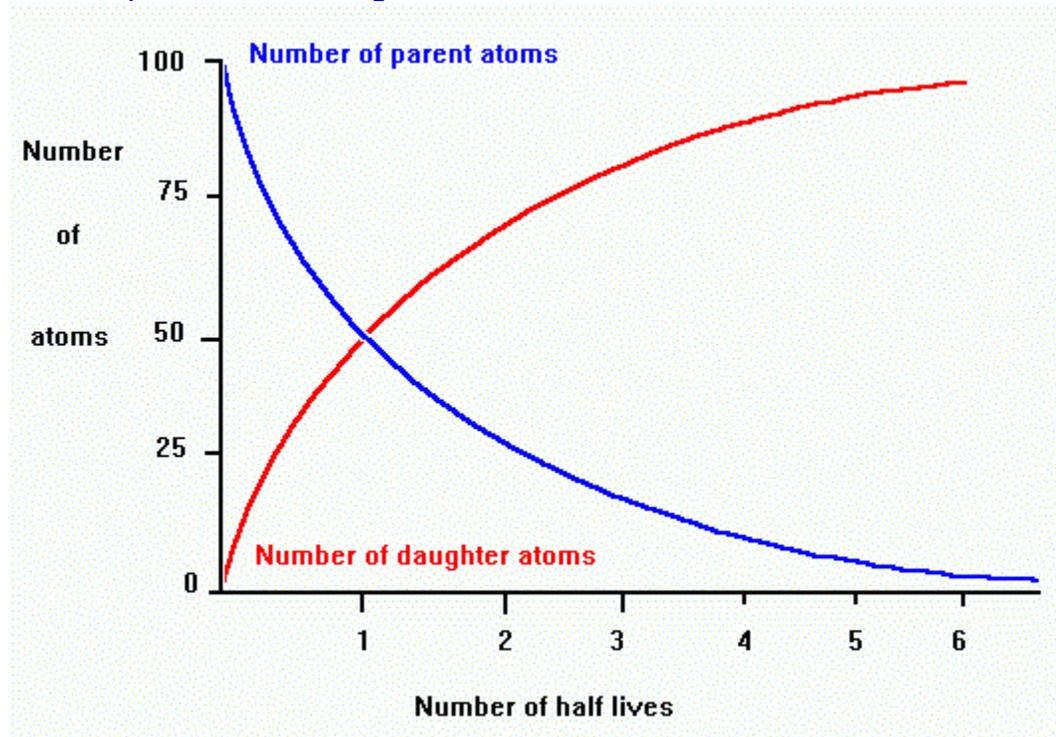
C12 - 98.89%, C13 - 1.11% and C14 - 0.0000000010%

After 5730 years, the ratio in carbon-containing fossils is

C12 - 98.89%, C13 - 1.11% and C14 - 0.0000000005%

With each half-life, the amount of C-14 gets less and less. After 10 half-lives (57,300 years), so little C-14 remains in a fossil that it becomes very difficult to detect. Mass spectrometers are used to measure the small amount present, but beyond 50,000 years BP, even this is difficult to do accurately. A radiocarbon measurement, termed a **conventional radiocarbon age** (or CRA) is obtained using a set of parameters outlined by Stuiver and Polach (1977), in the journal *Radiocarbon*. A time-independent level of C14 activity for the past is assumed in the measurement of a CRA. Dates are related to the C-14/C-12 ratio of the earth in 1950 (prior to atmospheric nuclear bomb testing).

PHOTO LINK: CARBON 14 DATING 010 Decay curve diagram, Tom Higham, 2004. <http://www.c14dating.com/>

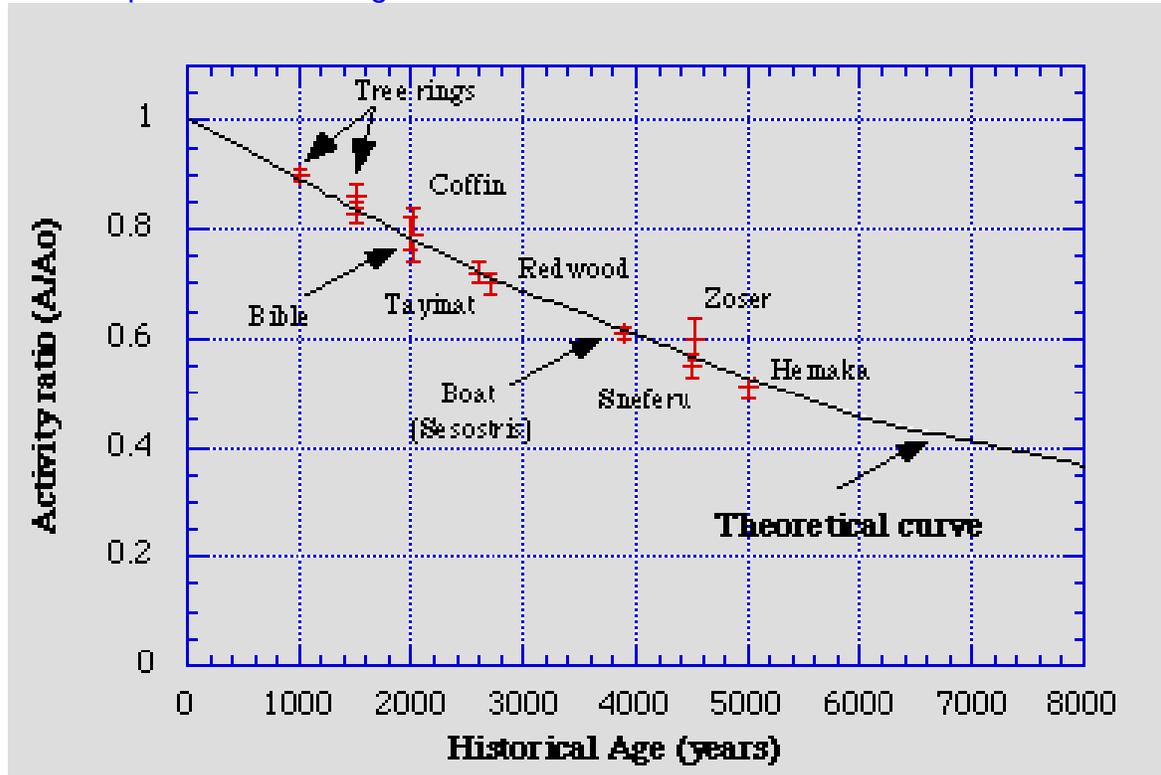


The Conventional Radiocarbon Age BP is calculated using the radiocarbon decay equation:

$$t = -8033 \ln(A_{sn}/A_{on})$$

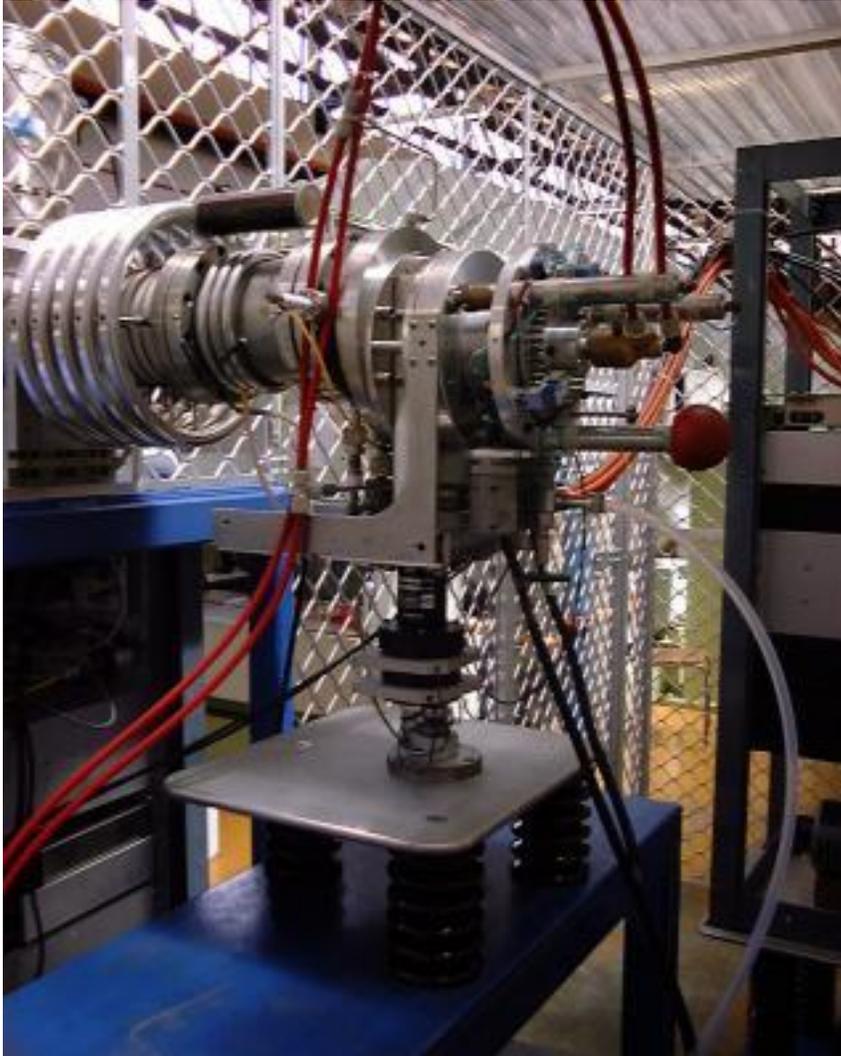
Where -8033 represents the mean lifetime of <sup>14</sup>C (Stuiver and Polach, 1977). A<sub>on</sub> is the activity in counts per minute of the modern standard, A<sub>sn</sub> is the equivalent cpm (decay counts per minute) for the sample. 'ln' represents the natural logarithm.

PHOTO LINK: CARBON 14 DATING 003 Curves of Knowns, Tom Higham, 2004. <http://www.c14dating.com/>



The technique was limited to dating samples below 10,000 years until Mass Spectrometers were used to detect very small amounts of C-14. Using this tool, C-14 dates are extended back, in some cases, to 700,000 years.

PHOTO LINK: CARBON 14 DATING 004 Diagram of Mass Spectrometer, Tom Higham, 2004. <http://www.c14dating.com/>



Tom Higham, 2004

But how can we be sure that the original ratio was equal to the present C-14/C-12 ratio? Since the Industrial Revolution in the 1800's, C-14 depleted carbon has been added to the environment and since atomic bomb testing, C-14 levels in the atmosphere has increased. The earth's magnetic field has been decreasing in intensity and is about 7% since its value was first measured in 1821 (McDonald and Gunst. 1967). Cosmic rays are deflected by the earth's magnetic field. So in the past, with a stronger magnetic field, less C-14 was being produced than today. These processes and events negate the assumption that present levels of C-14 were the same as ancient ones. So some modifications in the C-14 dating technique are needed.

We can check to see what the original C-14/C-12 ratio was in the past by comparing C-14 dates with tree rings (dendrochronology). Some rare varieties of pine tree (the Bristlecone pines of California's White Mountains, *Pinas aristata*)

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have tree rings that can be analyzed and (from several trees) counted back to 5,000 years. Each ring represents one year of growth and so make a good cross-check of the C-14 method.

PHOTO LINK: CARBON 14 DATING 007 Tree ring dating; Tom Higham, 2004.  
<http://www.c14dating.com/>.

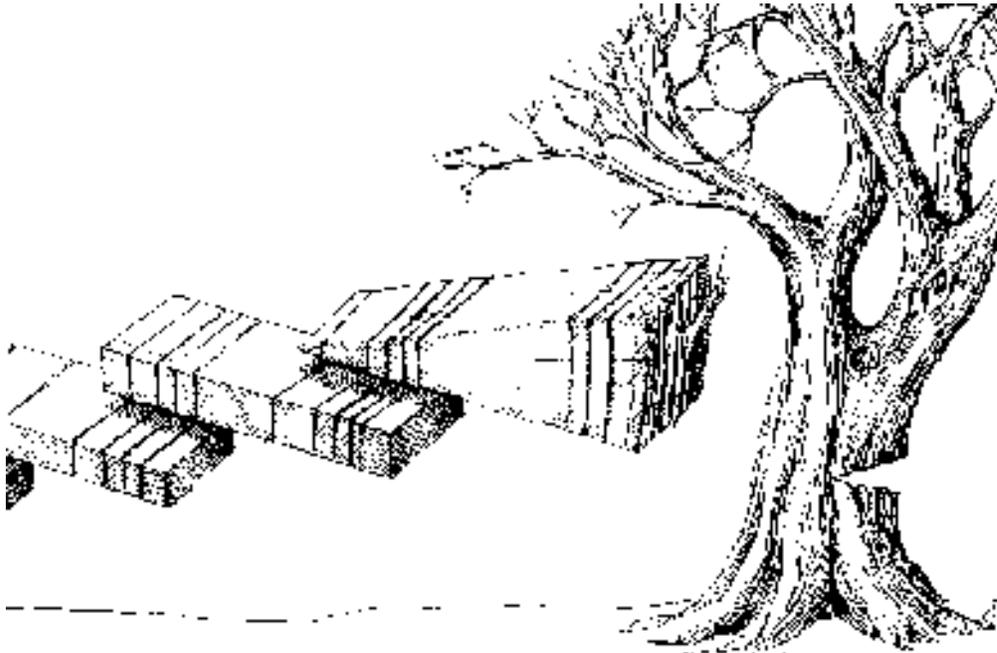
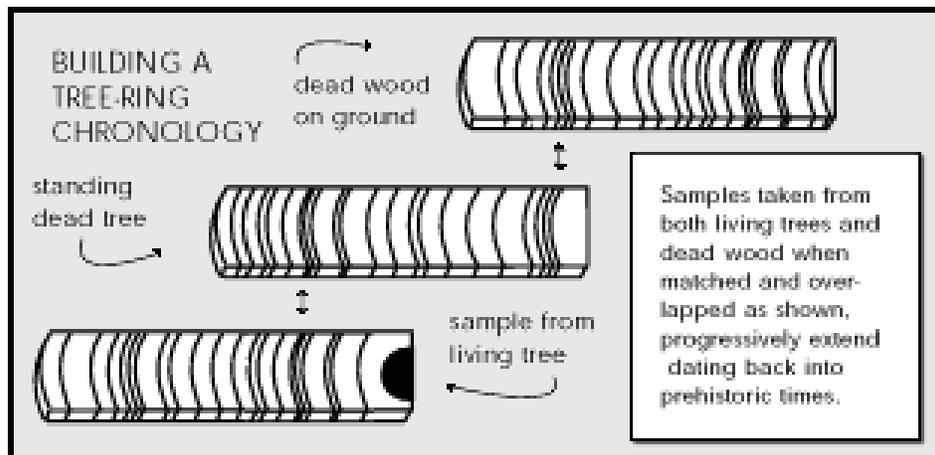
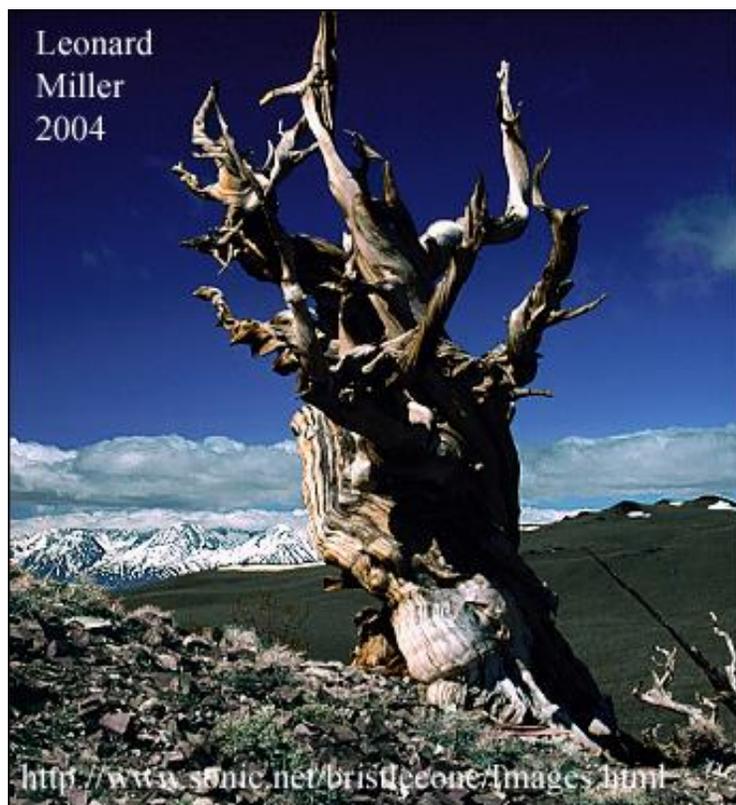


PHOTO LINK: CARBON 14 DATING 008 Ring counting demonstration ; Leonard Miller <http://www.sonic.net/bristlecone/Images.html>, Oct. 13, 2007



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PHOTO LINK: CARBON 14 DATING 009 Bristlecone pine tree, Leonard Miller, <http://www.sonic.net/bristlecone/Images.html>, Oct. 13, 2007



A similar technique was applied to oak trees in Irish peat bogs. The results of this comparative analysis (bristlecone pines and peat bogs) show that the C-14/C-12 ratio was **not** exactly the same in the past as it is today. The C-14 ages for early civilizations gave dates that were too young, based both on literary records and the tree-ring dating. This indicates the central assumption about initial conditions used for in C-14 studies is not entirely correct. The past C-14/C-12 ratios were **not** the same as today. Does that mean that the method is useless? By no means.

Today's reported C-14 dates incorporate a correction factor to account for this difference between the CRA and actual age of a sample. This is done by modeling how the production of C-14 at different magnetic field intensities changed the earth's average C-14/C-12 ratio as shown in tree ring studies. In addition to dendrochronology, calibration of the C-14 curve is also assisted by comparing annual sedimentation cycles (varves) in lakes, which permit calibration back to 45,000. Calibration of the C-14 curve is also assisted by comparing annual sedimentation cycles (varves) in lakes (Lindsay, 2004; <http://www.cs.colorado.edu/~lindsay/creation/carbon.html>) and also by studies of slow-growing coral formations. The calibrated C-14 curve allows for accurate dating back to 45,000 years BP. All C-14 dates are reported with probable error in years (+/-).

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Note that the C-14 calibration correction is larger in older samples. The consequence of this condition is that the calibrated ages of older samples are less precise than for younger ones. For most biblical studies (e.g. after the Exodus, circa 1500 B.C.), the C-14 correction factors are on the order of 200 years and errors are generally about 50 years..

C-14 studies are an important tool of archaeology. This tool must be used with care and in conjunction with all other relevant data (literary, pottery, etc.) when formulating interpretations.

Materials that can be dated by the C-14 method include:

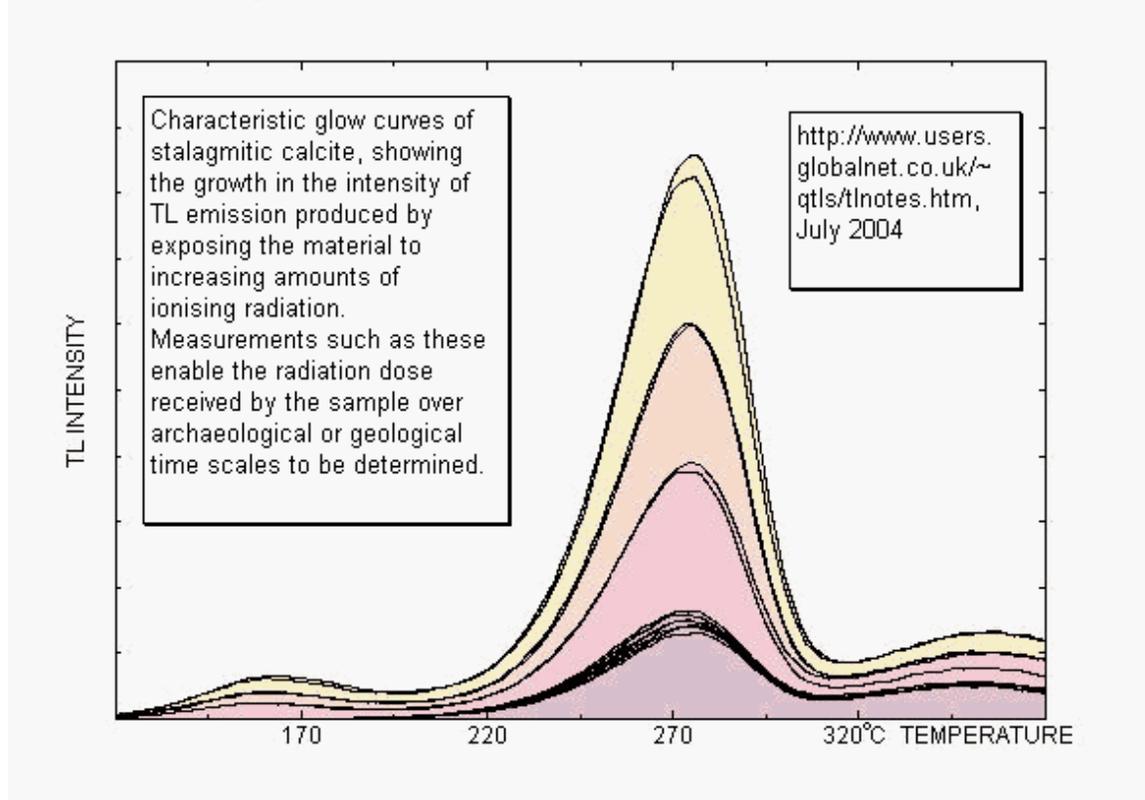
- Charcoal, wood, twigs and seeds.
- Bone.
- Marine, estuarine and riverine shell.
- Leather.
- Peat
- Coprolites.
- Lake muds (gyttja) and sediments.
- Soil.
- Ice cores.
- Pollen.
- Hair.
- Pottery.
- Metal casting ores.
- Wall paintings and rock art works.
- Iron and meteorites.
- Avian eggshell.
- Corals and foraminifera.
- Speleothems.
- Tufa.
- Blood residues.
- Textiles and fabrics.
- Paper and parchment.
- Fish remains.
- Insect remains.
- Resins and glues.
- Antler and horn.
- Water.

### **Thermoluminescence Dating**

As artifacts weather in the sun, rain and snow, changes in the mineralogy of the surface of the artifact occur. Silica minerals change from hard minerals (quartz,

feldspar) to softer, more opaque ones (clay). At a given set of environmental conditions, the amount of weathering can be related to absolute age. This technique is based on the difference in reflectivity, heat capacity and luminescence (the ability to give off light upon exposure to radiation) of weathered and un-weathered artifacts. The technique is not as precise as other methods but is easily applied and not as costly as other techniques.

PHOTO LINK: THERMOLUMINESCENCE DATING 001 Graph showing relationship of TL and temperature;  
<http://www.users.globalnet.co.uk/~qtls/tlnotes.htm#d11>, July 2004



**Uranium Disequilibrium Dating** Error! Bookmark not defined.

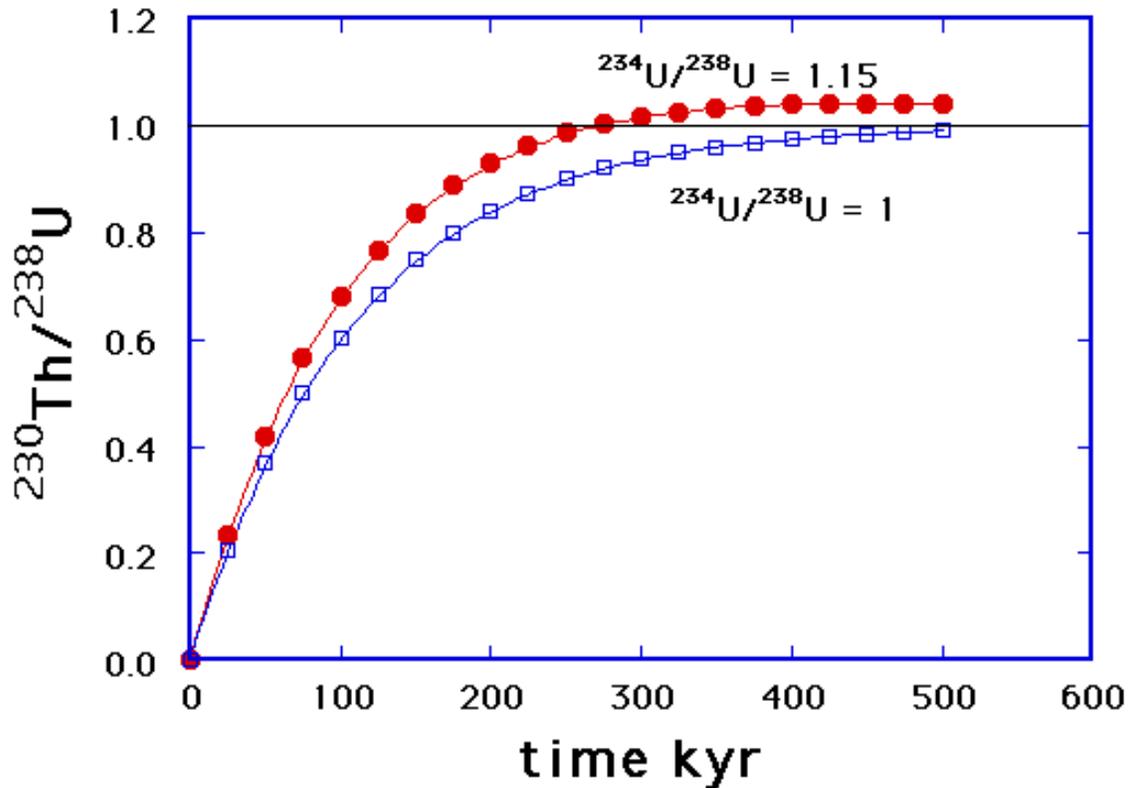
This method is based on the radioactive decay of two uranium isotopes: uranium (<sup>U</sup>)-238 and U-235. These isotopes slowly decay into lead (Pb)-206 and Pb-207 through a series of intermediate stages.

<sup>238</sup> U series		<sup>232</sup> Th series		<sup>235</sup> U series	
<sup>238</sup> U	4.47x10 <sup>9</sup> yr	<sup>232</sup> Th	1.40x10 <sup>10</sup> yr	<sup>235</sup> U	7.04x10 <sup>8</sup> yr
<sup>234</sup> Th	24.1 day	<sup>228</sup> Ra	5.75 yr	<sup>231</sup> Th	25.5 day
<sup>234</sup> Pa	1.18 min	<sup>228</sup> Ac	6.13 hr	<sup>231</sup> Pa	3.25x10 <sup>4</sup> yr
<sup>234</sup> U	2.48x10 <sup>5</sup> yr	<sup>228</sup> Th	1.91 yr	<sup>227</sup> Ac	21.8 yr
<sup>230</sup> Th	7.52x10 <sup>4</sup> yr	<sup>224</sup> Ra	3.66 day	<sup>227</sup> Th	18.7 day
<sup>226</sup> Ra	1.62x10 <sup>3</sup> yr	<sup>220</sup> Rn	55.6 sec	<sup>223</sup> Ra	11.4 day
<sup>222</sup> Rn	3.82 day	<sup>216</sup> Po	0.15 sec	<sup>219</sup> Rn	3.96 sec
<sup>218</sup> Po	3.05 min	<sup>212</sup> Pb	10.6 hr	<sup>215</sup> Po	1.78x10 <sup>-3</sup> sec
<sup>214</sup> Pb	26.8 min	<sup>212</sup> Bi	60.6 min	<sup>211</sup> Pb	36.1 min
<sup>214</sup> Bi	19.7 min	<sup>212</sup> Po	3.0x10 <sup>-7</sup> sec	<sup>211</sup> Bi	2.15 min
<sup>214</sup> Po	1.64x10 <sup>-4</sup> sec	<sup>208</sup> Pb	stable	<sup>207</sup> Tl	4.77 min
<sup>210</sup> Pb	22.3 yr			<sup>207</sup> Pb	stable
<sup>210</sup> Bi	5.01 day				
<sup>210</sup> Po	138 day				
<sup>206</sup> Pb	stable				

The half life of U-238 is 4.5 billion years and for U-235 it is only 450,000 years. This radioactive dating method is used to date some of the oldest rocks known in our solar system. The application of this technique for archaeological studies (which seeks to date artifacts usually less than 2 million years old) is based on the state of disequilibrium of the daughter products of uranium decay for samples between zero and 300,000 years old. The disequilibrium method cannot be used for samples older than 300,000 years because by that time equilibrium concentrations of daughter products are replenished at a constant rate as shown in the diagram, below:

PHOTO LINK: DISEQUILIBRIUM DATING 001

<http://www.huxley.ic.ac.uk/Local/EarthSciUG/ESFirstYr/EarthMaterials/mrpalmer/EarthMaterials/Iso/module6/m6.html> March 29, 2005



The relative abundances of daughter elements, uranium and lead in an artifact can be used to deduce its age. This method requires several assumptions about the initial amount of the different isotopes in the artifact. The method has been most successful at dating artifacts between 5,000 and 200,000 years old.

## BIBLICAL CHRONOLOGY

Literary, Relative and Absolute dating methods have been used on a variety of representative sites in the Mediterranean and Near East to produce Time Scales for archaeological studies in this part of the world. Various time scales have been proposed and there is considerable disagreement between many of them, particularly for the events prior to the Omri Dynasty of the Northern Kingdom. A summary of biblical chronology is found in a series of charts by Whitcomb (A Biblical Time Scale; Whitcomb, 1968a, 1968b, 1976):

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**BIBLICAL CHRONOLOGY  
CREATION TO THE FLOOD**

<b>Birth date in years after creation, Usher Chronology</b>	<b>Personage</b>	<b>Geologic Dating</b>
0	Adam	Stone Age, 2 million to 4,000 Before Present (BP)
130	Seath	
622	Enoch	
687	Methuselah	
1056	Noah	

**FLOOD TO THE NEW TESTAMENT**

<b>Birth date in years BC</b>	<b>Personage or Event</b>	<b>Archaeological Dating (years BC)</b>
4056	Adam and Eve	Paleolithic (Old Stone) Age (32,000 to 8,000) Neolithic (New Stone) Age; 8,000-4,000 )
4000	Seath	Chalcolithic (Copper) Age (4,000-3,000)
3000	Noah	Early Bronze Age (EB-I)
2165	Abram	Early Bronze Age IV (EB-IV) or Middle Bronze Age (MB-I)
2100 (circa)	Job	Early Bronze Age IV (EB-IV) or Middle Bronze Age (MB-I)
2090	Abram enters Canaan	Early Bronze Age IV (EB-IV) or Middle Bronze Age (MB-I)
2065	Isaac	Early Bronze Age IV (EB-IV) or Middle Bronze Age (MB-I)
2005	Jacob and Esau	Early Bronze Age IV (EB-IV) or Middle Bronze Age (MB-I)
1919	Levi	Middle Bronze Age IIA (MB-IIA)
1914	Joseph	Middle Bronze Age IIA (MB-IIA)
1525	Moses	Middle Bronze Age IIC (MB-IIC)
1485-1445	Moses in Midian	Late Bronze Age IA (LB-IA)
1445 (early date) or circa 1300 (late date)	Exodus	Late Bronze Age IA (LB-IA)
1406-1399 (early date) or circa 1250	Conquest	Late Bronze Age IB

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<b>Birth date in years BC</b>	<b>Personage or Event</b>	<b>Archaeological Dating (years BC)</b>
(late date)		
1373-1334	Judge Othneil	
1334-1316	Oppression of Moab	
1316-1237	Judge Ehud	
1237-1198	Deborah and Barak	Late Bronze Age IIB (LB-IIB)
c. 1200	Widespread destructions throughout Near East	Late Bronze Age (LB)
1198-1191	Oppression of Midianites	
1191-1151	Gideon	Late Bronze Age (LB)
1151-1149	Judge Abimelech	
1149-1126	Judge Tola	
1126-1105	Oppression of Moab (in the east)	
1107-1067	Judge Eli in Shiloh	
1087-1058	Judges Jephtha, Ibzan, Elon and Abdon	
1105-1020?	Samuel	Late Bronze Age (LB)
1069-1049	Samson	Late Bronze Age (LB)
1043-1011	Saul	Late Bronze Age (LB)
1001	David and Citadel of Zion, 2 Samuel 5:7	Iron Age IA (IA-IA) or Iron Age II (IA-II)
971	Solomon	Iron Age IA (IA-IA) or Iron Age II (IA-II)
966	Temple construction starts	Iron Age IA (IA-IA) or Iron Age II (IA-II)
931	Divided Kingdoms	Iron Age II (IA-II)
925	Shishak destroys Arad Stratum XII; 2 Kings 14:25	Beginning of Iron Age IIA (IA-IIA)
830	Jehu's Revolt; 2 Kings 9	End of Iron Age IIA (IA-IIA)
830	War with Hazael of Damascus; 2 Kings 8 to 13	End of Iron Age IIA (IA-IIA)
722	Fall of Samaria	Iron Age II (IA-II)
586	Fall of Jerusalem	Iron Age II (IA-II)
605-536	Daniel and the Exile in Babylonia	
536	Second Temple Started	
516	Second Temple	

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<b>Birth date in years BC</b>	<b>Personage or Event</b>	<b>Archaeological Dating (years BC)</b>
	Completed	
458	Ezra	
445	Nehemiah	
160-50	Apocrypha and Pseudepigrapha	

Note: Some scholars do not subdivide the Bronze Age into Early-Middle-Late, but only Early and Late. See Amihai Mazar (2003) for Iron Age IIA dates. See Hansen 2003:80 citing Ray (1997:6) for Bronze Age dates.